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ELECTRICAL MEANS OF MEASUREMENT.

Attention has been called upon many occasions to the powerful tool which electrical methods of measuring put into the hands of workers in their fields. For example; possibly the most important advance of recent times in furnace operations has been the adaptation of electrical methods of temperature measurement. Heretofore, the temperature of a furnace has been determined by guess and satisfactory working has been dependent to a large degree upon the experience of the man in charge. Now, while the value of experience has not been in any way diminished, electrical pyrometry has made possible accurate temperature determination and control. Only recently was noted the employment of an electrical method in another art, that of testing materials, which promises to be of great importance. Not infrequently other new uses are pointed out.

There are several reasons for this. One is the highly developed state of the art of electrical measurement. This started first with the physicist and then has been followed up by the engineer, who was forced to it since the commodity in which he deals is unweighable and invisible, and he was forced to develop satisfactory measuring apparatus. Later he became aware of the great importance of the accuracy of his instruments and this carried the art to a high degree of perfection, and has not been without influence on methods of measurements used in other branches of science and engineering, even when the measurements are made by other means.

Another reason for the increasing use of electrical means for measurement is the exceeding sensitiveness of certain of these means. For example, the spectroscope is frequently referred to as the most sensitive scientific instrument. By means of it, the chemist can detect the presence of elements in quantities far too small to be weighed, but a delicate electroscope may be several hundred thousand times more sensitive than the spectroscope, and besides this, it is a quantitative instrument, while the spectroscope is only qualitative.

But one feature of electrical methods of measuring which will surely have great influence in extending them is the fact that the effect to be measured may be produced at one point and measured accurately and conveniently at another. The effect on a thermocouple placed in a furnace is measured by a galvanometer set off at a distance. The lengthening of a sample of metal under test is determined by measuring its resistance by an instrument placed where it is out of the way and unaffected by any happening at the testing machine. The speed and even the acceleration of a railway car are read directly without necessitating the use of a watch by an observer seated comfortably at a table in the car itself. This feature, the ease with which the action to be observed can be made to produce an effect some distance away, is one which is sure to lead to a wide extension of electrical methods of measuring into many new fields.

OHIO ELECTRIC LIGHT ASSOCIATION CONVENTION.

The twelfth annual convention of the Ohio Electric Light Association, held last week at the Hotel Victory, Put-in-Bay, was notable in several respects. Primarily, it showed the healthy condition of central station growth throughout Ohio and the loyal and active interest which the central station representatives are taking in their organization. The Ohio Electric Light Association is supported by a very fair proportion of all the central stations throughout the state. Out of some sixty central

stations affiliating with the association, there were representatives from forty odd central stations. The interest manifested in the reading of the papers and in the discussion was proof against the distressing hot-weather conditions which prevailed during the three days of the meeting. Outside of the weather, however, the other features were, on the whole, satisfactory. In fact, the island appears to be an almost ideal place for a convention of this nature. There was a fraternizing of the central station men that could hardly obtain in a large city, where other attractions would be such as to divert attention from the business and executive sessions, and invite the scattering of the delegates. The presence of a large number of ladies, and the generosity of the manufacturers in making available a number of valuable trophies, lent a grace and charm to the meeting which helped markedly toward its success.

As usual, the list of papers presented was considerably above the average, and it is to be regretted that space can not be given to a more complete presentation of the subjects under discussion. The symposium upon the subject, "High-Efficiency Lighting Units in Ohio," brought out a valuable lot of information and showed that the Ohio central stations are on the firing line in introducing these units. The paper by F. W. Willcox, on "New Lamps and New Opportunities," was well received, the departure in the form of the illustrations creating considerable amusement, and, it seems, not in any way detracting from the ethical and technical value of the treatise. The discussion following the reading of the papers on the new high-efficiency units and upon the Nernst lamps clearly indicated the closeness of the competition in the lighting field. The nip-and-tuck debate of the representatives of the manufacturing companies, and the informal discussion which took place beyond the confines of the assembly room opened up a mine of information which was just what the central station manager was looking for.

An important feature of the programme was the presentation of papers dealing with the commercial side of central station development. This feature is becoming of greater importance and more time is being given to its deliberation. The papers presented at this session were very helpful, and clearly indicated the awakening which is taking place throughout the entire country in the direction of stimulating the demand for current and in creating an interest in the subject of electrical supply. For the Cooperative Electrical Development Association, Mr. J. Robert Crouse addressed the convention, outlining the comprehensive plans of this organization and giving an idea concerning the work which had already been accomplished. Considerable interest was manifested in Mr. Crouse's remarks, and the Ohio men apparently are enthusiastic over the possibilities of this enterprise.

EDUCATING THE PUBLIC IN SCIENCE.

An appetite on the part of the reading public for scientific stories is a healthy sign, for just as industrial progress, and therefore civilization, are dependent upon scientific advance and application, so is science itself dependent upon public sympathy for its support. The prosperity of a country depends, to a considerable degree, upon its keeping in the front rank of scientific advance, and also upon the degree to which it adopts scientific methods in all its work. To interest the public in science and to assist in spreading scientific knowledge accomplishes a double result, for, by encouraging the use of scientific methods, it increases present prosperity, and, by encouraging scientific research, it provides for the future. The rapid rise of Germany in the industrial world is largely to be attributed to her devotion to science, pure and applied. On the other hand, while England does not yield to any other country, as far as pure science is concerned, we have heard of late a great deal about her backwardness in making use of the knowledge which she and others have acquired. Only last fall was an association formed, known as the British Science Guild, the object of which is to popularize science; to make the average Englishman see how important it is that he adopt scientific methods; to show him how beneficial it will be for his pocket, and to warn him that only in this way can he hope to maintain a leading place in the world. Still more recently the matter was brought up in two addresses before the British Association. The president, E. R. Lankester, in the annual address, said that it is unfortunately true that successful political administrators of the affairs of England, as well as permanent officials, are altogether unaware to-day, as they were twenty-five years ago, of the vital importance of that knowledge called science, and of the urgent need for making use of it in a variety of public affairs. Whole departments of governments in which scientific knowledge is the one thing needful are carried on by men wholly ignorant of science. The only remedy which he could see for this unfortunate condition is in improving education for the upper classes, and a continued effort to spread a knowledge of the result of science and a love for it among all members of the community. He pointed to the not infrequent dedication of large sums of money in the United States as a solid test of the esteem and value attached to scientific progress in this country.

Dr. E. H. Griffiths, president of the mathematical and physical section of the association, also touched upon this subject. He believes, however, that the fault is not entirely with the British manufacturers, so far as the application of scientific methods is concerned, but thinks that the greatest need there is for missionaries to preach the doctrine that one of the greatest national assets is scientific discovery. Dr. Griffiths deprecated also the decreasing interest in science evidenced by the British layman. Sports of various kinds seem to occupy to-day the time which twenty-five years ago was given to study and investigation. This condition may be due partly to the excitement furnished by certain of the new amusements, but he thinks that a large part of it must be attributed to the system of education in vogue. It is impossible to-day for any individual to have more than a superficial knowledge of general science, for facts have accumulated so rapidly that science must be divided into many sections, and these sections subdivided, if a satisfactory study is to be made. Moreover, this rapid accumulation of knowledge is having a detrimental effect in another way, for the student of science is attracted by the novelty of recent work and gives his

time to reading about new investigations, when he should be studying the underlying principles. One, for example, will discourse fluently upon the mass of an electron and the nature of Roentgen rays, without being able to give satisfactory illustrations of Newton's laws. He shows familiarity with the recent developments, but a lamentable ignorance of the simple phenomena and principles they illustrate.

While possibly the conditions in this country are more satisfactory than in England, one can still find much room for improvement. A great deal of popular scientific matter is published which, even though it lack the accuracy and the reserved method of a truly scientific discussion, still has the virtue of being readable by the layman and of awakening or maintaining his interest in science.

In the system of scientific instruction in our schools we find, however, the faults noted by Dr. Griffiths, but we find also other unfortunate features. Our educators are so thoroughly convinced of the value of teaching science that they begin it in the elementary schools and continue it through all grades. The little tot who has just learned to read is taught science in one syllable. The next year perhaps he gets the same thing in two, and so on. This would be all very well, were it not true that it is the method of teaching which advances, and not the subject. Each succeeding year the student is carried over the same ground he covered the year before, getting, perhaps, but little further. Such a method necessarily involves a great waste of time. The subject should either not be taught in the lower grades, or else omitted from the higher ones. All admit the desirability of teaching some science, but the instruction should be given in the proper place, and other subjects equally as important should not be allowed to suffer.

We find, even, some openings for criticism in the methods pursued at certain of the colleges. In nearly all of them all students are required to do some work in science. Courses available for those whose time is mainly given to other fields must therefore be offered; but these, too frequently, seem to be designed more to interest the student than to instruct him. More thought is given to amusing him than to teaching him what is meant by science. Such courses frequently consist of more or less popular talks, profusely illustrated by means of the lantern. They soon become known as "snap" courses, and are taken because the student must take some such course, and he is told that this one will give him the least trouble. In this way the very object for which the course is designed is defeated, and all that is carried away from the lecture-room is a hazy jumble of names and pictures. And what is the value to a man of a few ideas scattered throughout a broad science, since they are apt to be obsolete in a few years? What he should have ground into him are a few, and perhaps only a few, principles; but these should be ground in in a scientific manner. It is not the actual knowledge of any science that he should have, but some conception of what a science is and what is meant by a scientific method.

In this country, fortunately, we are beginning to get out of the backward condition we have been in respecting scientific advance. Noble gifts by individuals, and generous appropriations by state authorities, are beginning to bring their rewards. While, possibly, we have been more ready to grasp industrial opportunities which science has made, we have not done our share in the pioneer work; nor can we do this until better conditions obtain at the large institutions of learning. There those who have the ability to do the work are so tied down with other duties that no time is left. This phase of university administration was recently discussed by President David Starr Jordan, of Leland Stanford University. He knows from experience, because he himself is eminent in scientific fields, the needs, and he also knows the difficulties. The way out seems to be to encourage those who show aptitude for research, relieving them of some of the other duties and assisting them to secure adequate apparatus; but, in all cases, the investigator should retain certain of his classes, for nothing gives one a clearer and more logical knowledge of a subject than the teaching of it. And, in the mean time, while these university reforms are being carried out, let the instruction of the public through popular writings go on. Such science, unless it be very bad, does good.

A CONDEMNATION OF THE ELECTRIC ROCK DRILL.

In the *Engineering and Mining Journal* for August 18, Mr. G. E. Palmer discusses rather briefly the merits of the electric drill for piercing rock, and comes to the conclusion that it is not a satisfactory device. Although he gives much credit to the inventors and designers of such drills, he seems to think that the character of the work is not at all suitable for electrical methods. The success of the compressed-air and steam drills lies in their very ruggedness, for they probably may be classed among the most inefficient of modern tools. The greatest difficulty with the electric drill seems to be in maintaining the insulation, for it is admitted that it cuts a straighter and smoother hole, is more efficient, is cheaper and more flexible. But, in the language of the street, "it won't stand the racket."

Possibly Mr. Palmer's conclusions are entirely justified. It does not follow that the best means of transmitting energy is always the best method of applying it, and there is no disgrace if it can be proved that the older devices are, in the end, the better. But would it not be possible to better the conditions under which the electric drills are used, and thus obtain the advantages with which they are credited? Electric motors are doing good service in coal mines, where the conditions are certainly severe. Perhaps a little higher grade of labor would throw the balance the other way. One of the necessary consequences of the introduction of more perfect devices is the employment of better-trained labor to take care of them. It ought to be possible to-day—and we do not doubt that it is—to turn out an electric drill that would stand any service that it could justly be called upon for; but it does not follow from this that such a drill will be the most satisfactory. We have heard a good deal about the beauties of the combined electric-compressed-air drills, in which the flexibility and economy of the one are made use of for transmitting the power, while the ruggedness of the other enables this to be applied without danger. If such a combination should prove to be the best all-around tool, the electrician has nothing to be ashamed of; but we are not yet ready to admit that a satisfactory electric drill is an impossibility.

Ohio Electric Light Association.

Twelfth Annual Convention, Put-in-Bay Island, Ohio, August 21, 22 and 23.

THE annual meeting of the Ohio Electric Light Association, held at Put-in-Bay island, lake Erie, Ohio, on August 21, 22 and 23, was well attended by central station men as well as manufacturers' representatives. It is the rule at these outings for members and guests to bring with them their ladies and families, and considerable attention is paid to the social as well as the business side of the convention. The innovation introduced last year of distributing prizes to the ladies was continued at this meeting, and a number of the companies contributed electric fans, cooking utensils, fixtures and other articles of domestic use or ornament.

TUESDAY AFTERNOON SESSION.

The first business session was called to order at 2 P. M., Tuesday, August 21, by Secretary-Treasurer D. L. Gaskill, of the Greenville Electric Light and Power Company, who announced that owing to the fact that President Valentine had during the year taken up other business, and severed his connection with electric lighting interests, his duties had devolved upon Vice-President W. E. Russell (Massillon Light, Heat and Power Company), who would preside over the convention, and had been the acting president since Mr. Valentine's retirement.

Mr. Russell delivered the annual address of the president, in which he referred to the fact that during the year the business of electric lighting has shown a healthy growth in Ohio, although prices have ranged downward and gas competition met. The address emphasized the necessity of careful attention to cost of production in the direction of which practical work has heretofore been done by this association. A recent decision in a case tending to establish greater certainty in the construction of the law as applying to the rights of the companies in fixing rates based upon equitable considerations was favorably approved.

The court decided that the municipality must recognize the equity of considering the maximum cost of service to any substantial class of users as being based on hours of use. Acting-President Russell commended the determination of the association to expend its effort in conventions more to the practical side of the central station business from the standpoint of new business, and how best to get and keep it. In closing, the necessity of united effort was spoken of, the recent great improvements in lamp-making approved, and further advances hoped for. The absence of President Valentine from the association membership and convention was greatly regretted. Acting-President Russell paid his compliments to all who had assisted the work of the association during the year past.

The following new members were elected:

Active—Toledo Gas, Electric and Heating Company, J. E. Lockwood, manager electrical department; Bucyrus Gas and Electric Light Company, H. O. Dutter, manager; Citizens' Gas and Electric Company, Wm. M. Adams, general manager, Elyria; the United Electric Company, Denison, O. B. Welch, general manager; the Dayton Lighting Company, F. M. Tait, general manager; the Bellevue Illuminating and Power Company, F. B. Carr, secretary-treasurer; Salineville Electric Light, Heat and Power Company, Salineville.

Associate—Illinois Electric Company, Chicago, F. D. Rusling, Ohio representative; Pittsburg Transformer Company, H. G. Steele, secretary, Pittsburg, Pa.; C. W. Lee Company, Newark, N. J., Frank B. Rae, Jr., secretary.

The remainder of the afternoon was given over to reading of papers, discussion of same being deferred until next day, owing to the excessive heat. All of the papers were printed and distributed to the audience so that the speaker might be intelligently followed and points for discussion noted.

On the general subject of high-efficiency lighting units in Ohio three papers were contributed by central station men, one of these being the joint production of two authors.

The first of these was by A. N. Cope, of the Public Service Company, Columbus, Ohio, who announced as his text "Progress in High Efficiency." His paper, he stated, had for its purpose a relation of the experience of his company in the operation of the Nernst lamp in a commercial field, in which its success had not been due entirely to its own high-efficiency feature but also to the contributing effort of the central station in its introduction and exploitation. This necessitates a careful study of the needs of the customer, especially where strong competition from electricity or gas or both must be met. When the Nernst was first installed by this company it was not satisfactory, but this the writer thought due to the then poor regulation existing and to deficient knowledge of the lamp and its capabilities. About April, 1905, conditions changed; the regulation improved and the demand for the Nernst continuing, it was adopted as the sole means of securing business from gas users, in which field it has since proved amply successful and satisfactory.

The larger introduction of the Nernst lamp was facilitated by an exchange of accumulating old stock of arc lamps which had begun to cumber the company's storeroom. The writer gives statistics showing as the result of his company's experience that the average kilowatt-hours' return per kilowatt connected to a classified and miscellaneous list of consumers was 70.47 for the arc, while for the same unit in Nernst it was 84.75 kilowatts, or twenty per cent more; sixteen and two-thirds per cent less connected load with the Nernst lamps therefore giving the same revenue, with the additional benefit of a better power-factor, an increase in burning hours and a better station load-factor. The flexibility of the system is especially appreciated; with the Nernst it is an easy matter to drop out a glower in each lamp and reduce the current consumption twenty-five to thirty-three and one-third per cent, and retain the good will of the kicker.

A feature of the Nernst lamp that must not be overlooked is, that with the same current density as in the 110-volt circuit, twice the amount of watts may be distributed, or the same energy with half the drop—a decided advantage in overloaded circuits in old installations. It is a panacea for unbalanced three-wire distribution. The writer thought that the lamps are defective in one point, that it is too hard to get at the ballasts to see their condition. The system of maintenance will depend upon the number of lamps installed. The number of ballasts burned out will indicate how well the glower voltage is adapted to the light voltage. The right kind of a maintenance man will get his glower instruction from the ballast condition. In conclusion the writer says, "I firmly believe that, had our electric competition been less keen, central station conservatism would have had less general progress of high-efficiency lighting units to report."

The next paper of this series was jointly

written by T. D. Buckwell and John Gilmartin, both of the Toledo Railway and Light Company. They hold that the introduction of these high-efficiency lighting units has been beneficial to the central station man in broadening the field for the employment of electricity as a lighting agent. The central station man is thus better able to meet competition and satisfy the most exacting as to the quantity and quality of illumination.

F. W. Willcox, of the General Electric Company, Harrison, N. J., read his paper on "New Lamps and New Opportunities," which was a vigorous and clear presentation of the subject from the writer's standpoint. Mr. Willcox believes in no halfway measures, but that central station managers should boldly put out the highest-efficiency lamps found feasible, with the design of giving to their customers the very best service possible in pursuance of a policy of liberal progressiveness which he thinks will be surely profitable in the long run.

The last paper of the afternoon was that by Max Harris, of the Nernst Lamp Company, Pittsburg, Pa., entitled "Some Notes on High-Efficiency Units by the Manufacturer." This paper was written by Mr. Harris in response to an invitation extended to him to present the standpoint of the manufacturer in connection with the views expressed in previous papers by central station men as to high-efficiency units.

The convention then adjourned for the afternoon.

WEDNESDAY MORNING SESSION.

The first announcement Wednesday morning was the appointment of the committee on nominations by the executive committee under the rules, *viz.*, Messrs. Rust, Maxon and Hanley.

Under the general subject of "Ways and Means of Increasing Business" the convention listened to a series of papers by central station men, all of which were short, crisp and practical. They will be taken up in their order as read; first, S. M. Rust, of the Greenville Electric Light and Power Company, whose keynote was attention to details and cultivation of the patrons' wants. Summing up, Mr. Rust says, "I would say that the following will increase business in any town: reasonable meter rates; good service; courteous treatment; good wiring at or near cost; free renewals; continuous service; attention to small details; cultivation of acquaintances; careful attention to plant; wiring to be paid for when desired on instalment plan, or on reasonably long time; offering of inducements in the way of labor-saving and comfort-giving appliances as will enlist the interest of the ladies; and at all times work to convince the people that the company is working to their interest and will do everything possible to render the business relations between the company and the patron pleasant, agreeable and profitable to both."

The next contributor to this series was W. C. Anderson, of the Canton Electric Light and Power Company, who, like Mr. Rust, emphasized the factor of good service as the principal one in getting and retaining business for the central station, and the giving of the very best value possible for the money. Every city in Ohio should be lighted by a privately owned electric lighting plant, which such a company can do at the minimum of profit, inasmuch as by installing a proper pole system for the public business it is better equipped to handle the commercial and residence lighting. The consumers must be thoroughly classified and charges established with due regard to investment cost and operating expense that shall be equitable as between the various classes of users and the company. Large consumers must have special rates or isolated plants will result. The residence lighting should be on the two-rate basis, the demand being computed as a certain percentage of the lamps wired. The writer condemns maximum-demand meters. The two-rate system will meet all the prominent classes of customers except small-motor and long-hour users. For these a flat rate may have to be resorted to, especially in small cities. Too much care can not be taken in classifying business to make the rates bear justly as against each particular class.

In connection with the next paper literature was distributed, being the bulletins of the Dayton Lighting Company, designed by the C. W. Lee Company. The third paper of this series takes up the same problem as applied to a large city, and was by Frank M. Tait, manager of the Dayton Lighting Company, one of the new members. His paper first considers the details of soliciting new business, employing a card index and the active work in charge of energetic and capable young men as canvassers, properly superintended and their interest and close attention stimulated by means explained in detail in the paper. The work of the canvassers is supplemented by a follow-up scheme of individual letters. These should be written in a clean-cut style, enclosing stamped envelope or return postal-card and should be sent to a well-selected list and continued at intervals until results are secured. The importance of advertising is referred to, and especially the use of illuminated billboards, which show the public that the company has confidence in its own methods, and merchants having other commodities will not be slow to follow this advertising hint. The offering of electrical appliances of all kinds on free-trial basis is recommended, and particulars given. The paper was entertaining, concise and practical.

J. Robert Crouse, Cleveland, Ohio, addressed the convention briefly in reference to the objects, plans and results of the work of the Cooperative Electrical Development Association, which comprise, as has been heretofore noted in these columns, the promotion of the more extended use of electricity by the public for lighting, heating and power against all competitors for like service, and the establishment of cooperative relations, both morally and financially, among the different electrical interests from the manufacturer to the consumer, to the end that each may contribute in some measure toward bringing about results desired in common by all. Mr. Crouse quoted freely from a paper on the subject of profitable commercial cooperation, which was presented by him before the National Electric Light Association at Atlantic City, in June of this year. He gave a short outline of the plans contemplated for 1907, which are to be submitted in October or November to the joint committee of central stations, manufacturers, jobbers, contractors, etc. He asked that the Ohio Electric Light Association appoint a cooperating committee of two, one of whom shall be a representative of a purely electric and the other of a combination gas and electric company. The suggestion was favorably acted upon, and Frank M. Tait, of the Dayton Lighting Company, and D. W. Low, of the Alliance Gas and Electric Company, were later appointed as such committee.

A further series of papers on "Successful Ways of Increasing Business" were next presented, the first one of them by J. Kermode, of the Cleveland Electric Illuminating Company, who gave attention principally to the exploitation of cooking devices, incidentally suggesting the securing of the cooperation of contractors and architects in providing a proper number of outlets, and in other ways contributing to the improvement of the standards of construction from an electrical standpoint.

J. H. Maxon, of the Gallipolis Light and Coke Company, advocates in his paper

the placing of appliances, such as desk fans, laundry irons, small motors, etc., on trial and approval, the consumer to pay for current consumed in the regular way during the period of trial, but is under no obligation to keep the articles unless satisfactory after trial. At the end of the trial period, which should be thirty days, or not to exceed sixty days, to accept and pay for the installation upon such terms as may be agreed upon, or if not satisfied to retain same the customer can have them taken away without expense to him other than for current actually consumed.

D. W. Low, of the Alliance Gas and Electric Company, in his paper on this subject, explains the methods adopted by him to introduce gas stoves for cooking and other appliances. He puts these out for a stated period at customer's option of purchase. Of 500 stoves put out only two have been returned. In introducing motors, small horse-power motors were offered to parties who were using other forms of power, such as gas engines, with the understanding that if not satisfactory they would be removed without expense. At present all the printing in his place is done by electricity, current for telephone batteries is from the lighting plant, and all the ice cream is made by electricity, and part of all the bread mixing. Three or four large factories are entirely equipped with electric power, and the further introduction of motors is a very easy matter, as the public are now quite generally converted to the idea that they can satisfactorily use motors.

The last paper of the morning was by M. E. Turner, of Cleveland, on the same subject. After pointing out considerations which should tend to make the public liberal in their use of electricity for many purposes that add to their comfort and enjoyment of life, this writer says, "Electricity in the home has its most important function in lighting, but not necessarily its largest use. It can, and should even now be used for auxiliary heating and cooking; for cooling in summer, and for running the sewing machine at all times; for grinding the meat and polishing the silver, for ironing, and so on in numerous ways. To secure this business the public must be educated to recognize the value of its convenience to them; and this can best be done by effective advertising. Whether this be by personal solicitation or through literature, or both, we must, in order to have our advertising effective, attract attention, arouse interest and create a desire to possess the articles advertised. Further than this, proper wiring at time of construction of modern houses must be looked after. The residence patronage should be the largest and most profitable, yet many houses are not at present equipped with wiring, and therefore do not avail themselves of the convenience of electricity. With all residences properly wired, opportunity for larger demand would exist and be taken advantage of, so that the business would grow to large and profitable proportions. In Cleveland the possibilities in this residence load have been fully recognized, and a plan devised that puts it within the reach of nearly every householder to install electric service. Wiring and fixtures are furnished on the installment plan. Payments are not, however, made direct to the company, nor is it a party to the contract except as an agent soliciting the business for a contractor afterwards named by the company. The writer gives further particulars of the plan followed, and includes with his paper a reduced copy of a residence-wiring contract, which has been adopted after careful study by the Cleveland company.

WEDNESDAY AFTERNOON SESSION.

On Wednesday afternoon discussion of the papers read up to this time was invited. Max Harris objected to the statement made in the paper by Mr. Collins with regard to the comparative merits of the Nernst as opposed to the GEM, with reference to renewal cost, inasmuch as the same writer had stated in the introduction to his paper that his paper would be confined to the GEM units. He asked how many Nernst lamps Mr. Collins had in service at Columbus, of what type, and how he arrived at the figures of cost of maintenance as given in his paper?

Mr. Collins replied that he had been given to understand from what he believed to be a reliable source that the figures quoted were accurate. Mr. Harris stated it as his belief that the experience of a large number of present users of the Nernst lamps would not corroborate the figures referred to, but on the contrary would show a much better record for the Nernst in that particular.

Samuel Scovil, of the Cleveland Illuminating Company, one of the past presidents of the Association, who has not always been able to attend these meetings of later years, and whose presence was much appreciated, rose to enquire what was meant by a "high-efficiency" lamp, referring to the report of progress by T. C. Martin at the National Electric Light convention when he spoke of lamps that some of the Germans were getting out under special circumstances that were claimed to run as low as one watt per candle, and in some cases as low as one-half watt per candle, which he instances as an example of what might be called "high efficiency."

Mr. Kermode referred to the successful performance of both the Nernst and the GEM lamps in Cleveland, especially in competition with thirty-cent natural gas.

Frank Duncan (Salineville) enquired whether in his town of 3,000 to 4,000 inhabitants with not extra good regulation, probably about three per cent, and a variation in voltage of about five per cent, the new high-efficiency units could be used with success?

Mr. Harris stated that the Nernst units could be operated successfully on circuits having a variation averaging within five per cent above or below normal, and all guarantees on the average life are based upon a conditions of that sort.

George C. Osborn, of the General Electric Company, Harrison, N. J., stated with regard to high-efficiency lamps of the GEM type that they can be placed on any circuit where incandescents are used at the present time. Provision has been made to take care of central stations that are using 3.1 or 3.5-watts-per-candle lamps, and by adopting the middle or bottom voltage of the new units it will give them the same life as they are now getting on the 3.5 lamps.

Mr. Turner suggested that the question asked was how to regulate the high-efficiency lamps, for instance, if the average on the circuit is 118 volts, what is the most efficient lamp?

Mr. Osborn replied that with a central station operating 118 volts that has been getting satisfactory service from the 3.1-watt-per-candle lamps they should adopt the new lamps in the middle voltage.

C. E. Inman, Warren Water and Light Company, reported that they had quite a number of Nernst lamps on their circuit, and so far had not found the maintenance cost any greater than renewals of incandescent lamps. He had not figured in the labor in the cost of replacing glowers, but the maintenance on renewal parts is about two mills per kilowatt. His company had purchased their first lot of Nernst lamps two years before they made their further purchase, and are using them now a year and a half since the second purchase was made, and had found them satisfactory. Ordinarily his regulation is about two per cent; not as good in the daytime as at night because they carry sometimes as high as 150 kilowatts on the power circuit in the daytime. It is, however, quite good for a small plant. It is nearly elimi-

nated at night, when the Nernst is burning mostly.

J. C. Fish, of the Shelby Electric Company, objected to the term GEM being pronounced G.E.M., holding that so pronounced it gave the impression that the lamp was an exclusive General Electric product; he preferred that it be referred to as the Gem lamp, because there might be some central station men who would want to buy such a high-efficiency lamp, and they should not be led to suppose that they could only obtain it of the General Electric people.

D. L. Gaskill, of the Greenville Electric Light and Power Company, thought that the high-efficiency units were a godsend to the smaller towns especially because they permit the central station to offer a light of great power for the minimum of expense, and the peculiarity of the smaller towns is that the people want the best light, but they do not want to pay a high price for it; in Greenville, a town of some 8,000 population, both the GEM and the Nernst lamps are in use, but the speaker did not care to enter into invidious comparisons or to pass upon the merits of either lamp as opposed to the other. The GEM with reflector behind it has some advantages which the storekeeper appreciates; on the other hand they do not find that the renewal cost of the Nernst is objectionable. The higher-efficiency lamp that can be put out the better for the business in general.

F. W. Willcox, Harrison, N. J., stated that taking the comparison on the basis of mean spherical candle-power the figures as stated by Mr. Osborn would be found correct, and about one-sixth in favor of the GEM on first cost; there is a great difference between claimed candle-power values and actual values. The price of the lamps has been considerably reduced about three months ago.

Mr. Harris said that from the standpoint of practical comparison it has been demonstrated that the two-glower Nernst lamp consuming 176 watts will successfully do the work that the 250-watt high-efficiency GEM lamp accomplishes. The question is, whether the cost of the two-glower or three-glower lamp to the central station is six times as great as the cost of an equivalent unit of the high-efficiency lamp. The chair announced that the discussion of the papers read by Messrs. Rust, Anderson and Tait would be in order. Mr. Scovil (Cleveland), asked Mr. Rust if he would give some further reasons in support of the policy of free lamp renewals.

Mr. Rust stated that he could not give any better reason than that set forth already in the paper, that if the lamps were renewed free patrons would not allow the sockets to be empty, whereas if they had to replace burned-out lamps themselves they would allow their lamps to run out, and many times not use light where otherwise they would do so, and thus affect the monthly bill.

Mr. Inman reported that it was his practice to instruct his repairmen whenever they discover a black lamp to see that same is replaced promptly with a new lamp; he furnishes free renewals.

In response to inquiry from Mr. Scovil as to the method of carrying the free renewal idea into effect, Mr. Rust stated that his company let it be understood that any consumer upon bringing a burned-out lamp to the office could exchange it free for a new lamp. All regular lamps are included under this offer.

Mr. Willcox suggested that a good plan would be to offer a specified number of renewals for a certain number of kilowatt-hours' consumption. This would give to the consumer something in proportion to the amount of revenue derived from him.

W. C. Engel, People's Gas and Electric Company, Defiance, stated that their plan was to have the meter reader carry extra lamps with him in his buggy, and when reading the meter ask the lady of the house if any lamps need renewing, and if so, to supply same free. This had proved satisfactory.

Mr. Scovil stated that in his city, Cleveland, they did not give free renewals, but he thought it was more a question of precedent with them than conviction. They had never given free renewals and as a matter of habit had continued that plan. In the smaller cities the speaker thought that no doubt the furnishing of free renewals was probably all right, but there was something to be said on the other side. He thought if you were going to adopt the free renewal idea the plan suggested by Mr. Willcox was probably a good one. Then the lamp user would be treated equitably according to the light he used.

The convention next listened to a paper by Wm. Wolls, of the Columbus Railway and Light Company, on "Gas Engines in Competition with Electric Motors." Mr. Wolls says, "It is generally a struggle to secure a power customer in the face of the keen competition of to-day, with both gas and steam, but it is a matter of satisfaction to the engineer who is negotiating a commercial power deal to know that if he closes the contract and the customer's building or factory is equipped with motors that the service supplied will be non-intermittent with pressure commercially constant, as there is no better reference than a satisfied customer."

The next paper read was by Charles A. Parker, of Detroit, Mich., upon the title, "Advertising and New Business Getting." In the course of the paper, the title of which is suggestive of its contents, Mr. Parker said: "Why should the central station man, purveyor of one of the most advertisable things in the world shut himself, as he too often does, in a gloomy barracks of a power-house way out on the city limits, and preserve a deadly silence toward the rest of humanity?" And why —when some enterprising soul does brave a two-mile walk to find if he can have a little electricity should he be greeted with a nervous glance as if he were a trespasser or a tramp? The successful central station man of to-day and to-morrow is the man who welcomes and makes much of a possible customer; who keeps his bright, well-trained solicitors constantly busy calling on interested people; who employs good live advertising capable of arousing popular interest, and sends out same to lists of residences, stores and factories situated adjacent to or upon the company's lines; and who has always a broadminded up-to-date business welcome for new business, and a proper fostering care of the business already contracted for. Mr. Parker urges the adoption by central stations of the monthly bulletin to instruct people as to the manifold uses of electricity, and drive home the point. The solicitor whose coming has been heralded by good, forceful, direct-by-mail advertising finds a ready acquaintance with electricity abroad in the land, and he finds the mind of the customer prepared to receive his suggestions favorably. In conclusion, the writer urges that central station men illustrate their own product by employing their own electric signs.

J. R. Cravath, Chicago, Ill., presented his paper on "Wiring and Lighting Equipment of an Eight-room, $3,500 Residence." This was recognized as a practical contribution to literature upon such subjects, and was listened to with a great deal of interest.

By request, Mr. Cravath supplemented the paper as printed and distributed to the convention by some remarks upon the subject of the lighting of small churches, his device explained being, however, applicable to churches of any size, and to all auditoriums. He referred to the fact that lighting units are generally placed in halls and churches where they are visible, or at least the fixtures are visible,

and the lights are not turned out during the service usually so that a person must sit and let the light shine in the eyes during the entire service. In the case of people with weak eyes this is very objectionable. Even those with strong eyes will no doubt eventually feel the strain. The speaker then showed blue prints and drawings on blackboard of his device for obviating this bad effect, the fixture being placed at such an angle as to keep the light out of the eyes of the audience or congregation.

The papers read at this session were not discussed at this time.

On motion of B. S. Young, chairman of the publicity committee, the following resolutions reported by him from this committee, were unanimously adopted:

WHEREAS, The Toledo Car Association has recently by resolution as announced by circulars posted reduced the time limit for unloading coal from ninety-six hours to forty-eight hours; and,

WHEREAS, The demurrage charge *per diem* for further delay in unloading is $1 for each twenty-four hours thereafter; and,

WHEREAS, The agreement between railroads or transportation companies is, that a charge of only twenty cents for each twenty-four hours is made for cars while off their right of way; and,

WHEREAS, The demurrage at the rate charged shippers would amount to $300 per annum, approximately one-half of the value of the car, and is in every way unjust and exorbitant; be it

Resolved, That this association hereby protest against said action of the Toledo Car Association as being an unjust discrimination against the shipper, and the officers of this association are hereby authorized and instructed to file notice with the said Toledo Car Association of this protest, and to cooperate with all other associations of shippers in an earnest effort to have this resolution rescinded, or to have the demurrage charge reduced to the amount incurred against the railroad delivering the shipment, which is twenty cents per day.

Also the following:

WHEREAS, It has been the custom of railroads to confiscate coal shipments and to divert them to their own use; and,

WHEREAS, This practice operates to the serious injury of light and public service companies, adds to operating expense and financial loss, creates dissatisfaction among customers or patrons of public service corporations, and seriously interferes with their operation; be it

Resolved, That the executive committee of this association be and hereby are authorized to cooperate with the proper officers of public service corporations to the end that proper legislation may be enacted to effectually correct this evil.

Owing to the excessive heat an adjournment was now taken until Thursday morning.

THURSDAY MORNING SESSION.

The following were admitted to membership:

Associate—The Shelby Electric Company, and the Cooperative Electrical Development Company, of Cleveland, Ohio.

The nominating committee reported the following officers nominated for the ensuing year:

President—W. P. Engel, Defiance.

Vice-president—C. C. Collins, Columbus.

Secretary-treasurer—D. L. Gaskill, Greenville.

Finance committee—E. J. Bechtel, Toledo; B. S. Young, Ada; J. H. Maxon, Gallipolis.

Executive committee—W. E. Russell, Massillon; M. E. Turner, Cleveland; D. W. Low, Alliance; E. H. Beil, Youngstown; F. M. Tait, Dayton.

Advisory committee—Samuel Scovil, Cleveland; W. E. Miller, Mt. Gilead; D. L. Gaskill, Greenville.

After some other routine business, including adoption of the report of Secretary-Treasurer Gaskill, which showed a balance in the treasury, the papers of the day previous were called up for discussion.

Mr. Turner differed with the statements in Mr. Cravath's paper discounting stand lamps as not good reading lamps, but only suited for writing purposes. He thought the discrimination against the stand lamp arose from the fact that many stand lamps are provided with a shade that is so deep that the light is cut off so that a person sitting near the table is unable often to read because of the shade. The speaker prefers a stand lamp, and believes that many others share this preference. A table lamp is an ornament, and the gathering about the table is a social feature of family life that is enjoyable. If a shade is used that will permit the light to spread far enough around a table four or five people may conveniently be seated about the table and all be able to avail themselves of the light for reading. For such purpose it is to be preferred to chandelier lighting.

N. R. Birge read his paper on "The Series Luminous Arc Rectifier System," describing briefly its construction, operation, advantages, efficiency, distribution, color and low maintenance cost. The essential features of the new system are the luminous arc lamp, with absolute cutout on the line and the mercury arc rectifier set in the station. The energy, economy, brilliancy of illumination and character of distribution are the marked advantages of the system. Readings made with a luminometer show that a luminous lamp consuming 310 watts at the terminals gives the same intensity of illumination at a distance of 309 feet that the 480-watt direct-current series enclosed-arc lamp gives at a distance of 275 feet, and that the 480-watt, alternating-current, enclosed-series lamp gives at 247 feet. The maintenance cost is very low; the upper electrode is copper, and the arc burns at a comparatively low temperature, which results in an average life of about 4,500 hours for this electrode, and a practically negligible cost for renewal. The lower electrode has a burning life of 150 to 175 hours, which allows one man to take care of and trim a much greater number of lamps than possible with open or enclosed carbon arc lamps. This long-burning feature and the fact that only one electrode must be removed gives marked economy in maintenance.

In the discussion following Mr. Birge's paper, Mr. Inman enquired whether any more difficulty was experienced with this system from lightning than from any other street-lighting system.

Mr. Birge replied that so far as he knew there had been no trouble reported.

Mr. Tait asked the proper height to hang the lights above the street to get the best results. Mr. Birge replied, twenty feet to twenty-five feet.

In reply to an enquiry, Mr. Birge stated the cost of tubes is $25, with an allowance of $5 for return of old tubes, making the net exchange price $20. Replying to enquiry by Mr. Maxon as to the greatest length of circuit practicable, the speaker stated this was practically the same as with the series alternating-current.

Mr. Custer enquired as to cost of renewals and as to how these compare with cost of renewals with series alternating-current lamps.

Mr. Birge stated that for 480 alternating-current enclosed-arc lamps the cost of maintenance, including trimming, carbons and electrodes, outer and inner globes, is $4.25 per lamp per year. Cost of luminous lamps, $2.95 per lamp per year. Tube renewals, figured on a basis of 700 hours (which figure was arrived at from reports from Glens Falls, N. Y., where five fifty-light outfits had been installed since January 1, 1906) for fifty-light sets, $2.28 per lamp per year. Total cost of maintenance of luminous rectifier system, including tubes, $5.23 per lamp per year. The above figures are based upon the assumption that lamps are operated 4,000 hours per year. Cost of energy will in a great measure depend upon local conditions. Assuming a cost of energy of one and one-half cents per kilowatt-hour, the 480-watt enclosed-arc lamp would cost $33.40 per lamp per year, and luminous lamps $22.14 per lamp per year—showing a saving of

$11.26 per lamp per year in favor of the luminous arc system. Deducting from this amount ninety-nine cents from the increased cost in maintenance shows a total saving for the luminous arc rectifier system over series alternating-current system of $10.27 per lamp per year.

Mr. Duncan enquired if the luminous arc could be run on ordinary direct current, to which Mr. Birge replied that a large number of Brush machines have been rewound for four amperes and are operating luminous arc lamps.

Mr. Duncan asked how the cost of rewinding a Brush machine compares with the first cost of installing rectifier outfits.

Mr. Birge stated that the cost of rewinding a No. 9½ or No. 12 Brush arc machine for four amperes will be approximately $1,000 or $1,200. Such Brush machines when rewound will each operate 100 to 125 lamps. The cost of a rectifier outfit of 100 lights' capacity, depending, of course, on the frequency and size of the set, would be approximately $2,300.

Mr. Scovil suggested that in using the old Brush rewound machine the tube renewals would be gotten rid of; to which the speaker agreed, and that this would reduce the operating cost, but added that the expense of maintenance of the Brush machines would in a measure offset that.

Mr. Turner asked whether a higher efficiency would not be obtained with the rectifier system than with the Brush arc machine. The speaker said that the efficiency of the Brush arc would be about eighty per cent, and the efficiency of the rectifier set about ninety per cent.

Mr. Maxon enquired whether in fitting up a new station the speaker would recommend direct current or alternating current. Mr. Birge replied that he would recommend the rectifier. Mr. Scovil asked whether this was for the reason that the same distributing mains would be used for other purposes? Mr. Birge answered for the reason was that it would do away with rotating machinery, and substitute the rectifier set, which could be operated directly from the alternating-current busbars.

Mr. Russell said that he had heard it urged against the magnetite arc lamp, whether justly or not he did not know, that there is a generation of gas that is very destructive to the internal parts of the lamp, and asked the speaker what he had to say as to this.

Mr. Birge replied that some iron fumes are given off by the lamp, which are carried up through a chimney and out into the air; in no way, so far as he knew, had they interfered with the mechanism of the lamp. This chimney has such a good draft that it carries all the fumes away, and none, or at least a very small amount, are deposited on the mechanism. With the first lamp brought out of the luminous type considerable trouble was experienced from this deposit collecting on the outer globe and giving the globe a yellowish appearance. This trouble was overcome by changing the construction of the upper electrode boxes, and the present standard lamp is so designed that no trouble whatever arises from smoked globes.

Acting-President Russell requested Mr. Grabill (of the Ashland Gas and Electric Company) to give the convention the benefit of his experience with an installation of these lamps.

Mr. Grabill stated that they changed at Ashland from Thomson-Houston open arcs to the luminous arc the 1st of last December. Under the former system their carbons cost them about $200 per year, whereas $50 worth of the new electrodes he finds will last about fourteen or fifteen months. As to fumes, has experienced no trouble with the lamps, which were of the first pattern put out, with swinging electrodes. Lamps inspected about twice a week. Of the ninety installed the speaker had not found one out, but all burning nicely and steadily on an inspection trip made just previous to coming to this convention. The policemen at Ashland report outages and the company is docked five cents an hour per lamp. The dockage under the old system used to run as high as $8 or $10, the lamps being inspected every night. It now runs as low as from $1 to $2.50, the latter figure having been reached during a month when the lamps were allowed to burn too long without trimming. Direct current is used. The speaker can drive around and easily trim the ninety lights and clean up globes in a day, and the electrician formerly employed to take care of the lamps has been dispensed with.

Secretary Gaskill, who, in addition to running an electric light and power plant at Greenville, Ohio, is also an attorney-at-law in active practice, presented an interesting paper on "Legislation, Its Uses and Abuses" in connection with the report of the advisory committee.

Mr. Scovil, of the Cleveland Illuminating Company, always a valued counselor, discussed the report and descanted somewhat broadly upon property rights in general, holding that the tendency which has manifested itself too widely of late years to attack these rights indiscriminately oftentimes seemed to discharge without reason its main effort against public service companies; whereas, if the individuals who make these attacks would give a moment's thought to the subject they would find that in attacking the rights of public service companies they are like Samson pulling down the strong columns which support the fabric of civilized society, and would involve all property rights in a common ruin. The ultimate basis for the defense of individual and corporate right to hold property, or even to will it to posterity, arises from the fact that society derives more benefit by individual and corporate possession of these rights than it could otherwise derive; that without the idea of individual ownership of property there would be no incitement to human endeavor.

The paper by Mr. Gaskill and the supplemental remarks by Mr. Scovil were, upon the suggestion of Mr. Low, referred to the executive committee with instructions to arrange for proper publication of the same.

Further discussion followed in the nature of an executive session and the report of the "Committee on Cost Determination" was submitted through E. J. Bechtel, of the Toledo Railway and Light Company, who, however, was unable to be personally present.

The Ohio Association, in common with others, several years ago realized the necessity for definite work along lines of cost determination, and the present committee report is a further contribution to the subject. A synopsis of the last report is given, and reference is made to an interesting paper read before the New England Association of electric light engineers, by J. S. Codman, a feature of which paper is a bibliography of former papers bearing upon this subject.

In discussing the report, Mr. Scovil remarked that companies who might have to go into the question of a maximum rate ordinance would do well to establish charges for current on a basis of standing and running charges, that in order to go into the United States Court on the ground that a given rate would deprive the complainant of its property without due process of law it would be necessary to show that such maximum rate fixed by the ordinance would not give a reasonable return for the use of the property devoted to the public convenience, taking into consideration all of the elements of cost. In

this connection, the cost depending upon the use which people made of an installation and investment placed at their disposal and required to be made for their service is an important point which can be applied in two or three different ways.

The convention next listened to the report of T. E. Crawford (Library Bureau, Cleveland, Ohio), of the "Committee on Uniform Accounting and Records."

The chair invited discussion of any papers concerning which members desired to express themselves, in response to which Mr. Low gave some account of his experience in placing small motors, along the same lines as covered in his paper, and Mr. Inman told of his success in installing similar motors, stating that he had in July a continuous output of 24.2 kilowatts on the power circuit, and 38.8 kilowatts on the alternating current, showing that the power circuit was coming up. His rates on the power circuit ranged from four cents per kilowatt down to two and three-quarters cents if the consumer used 1,865 kilowatts per month. He has now two consumers on the line who claim the two and three-quarters cents rate nearly every month. On elevator load for small motors below five horse-power he charges six cents per kilowatt. Upon first establishing these rates he was afraid that the peaks might conflict, but this has not proved to be the case, as the motor load commences to drop off just before the lighting peak comes on.

The paper on "Electrical Heating Devices, Their Latest Commercial Development," by H. J. Mauger, of the General Electric Company, Schenectady, N. Y., was elaborate and handsomely illustrated. The writer identified the activity of the central station in relation to heating devices with the organization of new-business-getting departments and the development of the commercial aspect of the electric lighting business.

Discussing the paper, Mr. Scovil enquired if the writer had calculated the cost of such a simple cooking outfit as a central station man should use in his own kitchen or home. Mr. Mauger replied that they had a tentative outfit, which would cost $55 net. This, however, is not large enough for a large family, the outfit for which is estimated at say $75. These figures are not final, however.

The convention having now completed its regular programme, President-elect Engel took the floor and briefly addressed the meeting. Pledging himself to work throughout his administration for the best interests of the organization, he invited suggestions from all, whether central station managers, supply men or manufacturers. He congratulated the material men and manufacturers on their hearty cooperation with and interest in the Association, and referred approvingly to the handsome exhibits made, which, he stated, were of a very attractive character. He was pleased that so many ladies had attended, and reminded the members that their presence did much to render these annual meetings enjoyable and to cultivate sociability and good feeling.

On motion of Secretary Gaskill, the thanks of the convention were extended to the donors of the several magnificent prizes presented to the ladies.

On motion of Mr. Turner, the committees on "Cost Determination," on "Records" and on "Publicity" were continued, and committees authorized to report on the "Progress of High-Efficiency Lighting Units" and of "Electric Heating Devices," the said committees to be selected later by the president and notified by mail.

Ohio Electric Light Association Convention Notes.

THE twelfth annual convention of the Ohio Electric Light Association was delightfully located at Put-in-Bay island. The central station men, supply men and guests greatly enjoyed the lake trip across from Cleveland, Sandusky, Toledo and Detroit. While the weather was oppressively hot during the business sessions, there was sufficient entertainment provided to offset the physical difficulties under which the attendants labored. The Victory park accommodations and the bathing were especially enjoyed, and the presence of a large number of ladies added very greatly to the attractiveness of this convention season.

Too much can not be said in the way of credit to those who engineered this convention. To Samuel Scovil, J. A. Bendure, D. L. Gaskill, M. E. Turner, E. J. Bechtel, M. C. Hull, W. E. Miller, W. P. Engel, B. S. Young, W. J. Hanley, George B. Dusinberre, A. A. Serva, L. B. Hoit, George Porter, N. C. Cotabish, Elliott Reynolds, F. W. Willcox, A. C. Robeson, Fred Bissell, E. F. Gwynn and E. H. Beil are due the thanks of all those present for the wealth of consideration which left no opportunity for anything but satisfaction.

On the morning of the first day of the convention quite a large group of attendants assembled on the steps leading to the veranda of the Hotel Victory, and a large group photograph was taken, a reproduction of which is given herewith. In this

W. P. ENGEL, PRESIDENT OHIO ELECTRIC LIGHT ASSOCIATION.

group may be recognized many of the men well known to the electrical fraternity, not only of Ohio and the central states, but throughout the country in general. Among the central station men present were the following:

W. E. Russell, Massillon Light, Heat and Power Company.

W. E. Miller, Mt. Gilead Water, Light, Heat and Power Company.

Edward Matt, Lancaster Electric Light Company.

C. C. Custer, Miami Light, Heat and Power Company, Piqua, Ohio.

E. T. Selig, general manager, W. B. Wilkinson, Mt. Vernon Electric Light Company.

B. J. Denman, W. B. Thompson, Edison Illuminating Company, Detroit.

C. S. Longnecker, manager, Delta Electric Light Company.

Frank M. Tait, The Dayton Lighting Company.

John Gilmartin, Toledo Railway and Light Company.

Frank Houghton, M. E. Turner, Samuel Scovil, J. T. Kermode, W. H. Kelsey, Arthur Pomeroy, Cleveland Electric Illuminating Company.

Louis T. Kaiser, Thomas Emery's Sons, Cincinnati.

Frank Espy, manager Consolidated Gas and Light Company, Tiffin.

D. L. Gaskill, A. C. Robeson, Z. T. Dorman, S. M. Rust, W. T. Fitzgerald, M. D., Greenville Electric Light and Power Company.

S. E. Falk, Bryan, Ohio.

H. C. Dye (municipal plant), Galion, Ohio.

H. P. Grabill, Ashland Gas and Electric Company.

Frank Duncan, Salineville Electric Light, Heat and Power Company.

James O'Toole (municipal plant), Hamilton, Ohio.

D. W. Cameron, Cambridge Power, Light and Traction Company.

E. L. Booth, Bellaire Light and Power Company.

J. H. Maxon, Gallipolis Gas and Electric Company.

W. P. Engel, People's Gas and Electric Company, Defiance.

C. E. Inman, superintendent Warren Water and Light Company.

C. B. Rodgers, Tiffin Electric Illuminating Company.

F. DeWitt, Miamisburg, Ohio.

THE CONVENTION OF THE OHIO ELECTRIC LIGHT ASSOCIATION, PUT-IN-BAY, AUGUST 21, 22 AND 23.

A. N. Cope, Columbus Public Service Company.

W. A. Walls, C. C. Collins, Columbus Railway and Light Company.

S. F. Messer, Warren Water and Light Company.

W. F. Hubbell, Wauseon Electric Light Company.

E. A. Bechstein, Sandusky.

R. R. Johnson, Northern Ohio Traction and Light Company, Akron.

J. E. Rockwood, Toledo Gas, Electric and Heating Company.

J. S. Rotting, East Liverpool Traction and Light Company.

B. S. Young, Ada, Ohio.

A. B. Young, Kent Water and Light Company.

D. W. Low, Alliance Gas and Electric Company.

The contests for the ladies were carried out with the scrupulous regard for fair play which was so splendidly illustrated last year by the referee-in-chief, W. P. Engel. The generosity of the manufacturers this year made it possible to distribute elaborate and costly souvenirs to nearly every one of the ladies present. These prizes were donated by the General Electric Company, Westinghouse Electric and Manufacturing Company, Libby Glass Works, W. J. Barr Electric Manufacturing Company, W. G. Nagel Electric Company, Electric Appliance Company, Robbins & Myers, Fisher Electric Company, American Electrical Heater Company, Post-Glover Electric Company, Cleveland Electrical Supply Company, Morean Gas Fixture Manufacturing Company, Star Electric Company, F. Bissell Company, Erner Electric Company, Doubleday-Hill Electric Company and the Fort Wayne Electric Works. The prizes ranged in importance from a heating pad to a magnificent lamp and cathedral glass dome. They were awarded as follows:

Euchre contest—(1) Mrs. P. J. Williams, Columbus, Ohio; (2) Miss F. M. Tait, Dayton, Ohio; (3) Mrs. George A. Williams, Cincinnati; (4) Miss Mary Gaskill, Greenville.

Guessing contest—(1) Miss Helen Gaskill, Greenville; (2) Mrs. George A. Williams, Cincinnati; (3) Mrs. H. C. Houck, Cincinnati; (4) Mrs. J. T. Kermode, Cleveland; (5) Mrs. A. A. Serva, Fort Wayne, Ind.

Bowling contest—(1) Mrs. Z. T. Dorman, Greenville; (2) Mrs. William

Adams, Elyria; (3) Miss Annette Miller, Mount Gilead; (4) Miss Mary Gaskill, Greenville.

Pedro contest—(1) Mrs. W. H. Kelsey, Cleveland; (2) Mrs. E. L. Booth, Bellaire; (3) Mrs. George R. Craven, Cleveland.

Second euchre contest—(1) Mrs. A. A. Serva, Fort Wayne, Ind.; (2) Mrs. P. J. Williams, Columbus; (3) Mrs. Z. T. Dorman, Greenville; (4) Miss Mary A. Gaskill, Greenville; (5) Miss Annette Miller, Mount Gilead; (6) Mrs. F. M. Tait, Dayton; (7) Mrs. R. E. Gorton, Warren, Ohio; (8) Mrs. F. B. Houghton, Cleveland.

W. P. Engel, the president-elect of the association, is easily one of the most popular central station men in the central states. His quiet earnestness has won him the admiration of the electrical fraternity, and his integrity of purpose and loyal service to the association made him the logical candidate for the executive position. Mr. Engel is of German descent, and was born at Kenosha, Wis., in 1861. He learned the baker's and confectioner's trade with his father, but at eighteen years of age became a trackman for the Chicago & Northwestern Railway, afterward becoming fireman on a passenger train between Harvard Junction and Elroy on the same system. In 1883 Mr. Engel visited England, France and Germany, and saw the first German alternator set up in Berlin by the Siemens & Halske Company. He became acquainted with one of the younger Halske sons, and took a deep interest in electrical machinery. Upon his return to this country he worked as a lineman for the Arc Light and Power Company, Chicago. He then took charge of a lighting plant at Charlotte, Mich., afterward purchasing this plant, which he still operates. Mr. Engel purchased the Defiance plant in 1900. This plant had been operated by several companies, all of whom had suffered disaster and inflicted pecuniary burdens upon their stockholders. Mr. Engel has successfully brought the plant out of this condition, and is operating what is known as the People's Gas and Electric Company, which supplies all of the public utilities of the city of Defiance, excepting the waterworks, namely: electric light plant, gas plant, hot water heating plant on the Yaryan system, the street-railway system, and a summer resort known as Island park. Mr. Engel is a member of the Northwestern Association, and has been affiliated with the Ohio Electric Light Association since 1900, serving on the finance committee in 1904, and on the executive committee in 1905.

The representatives of the manufacturers and supply men were out in force, and contributed very largely to the success of the convention. The large reception room of the Hotel Victory was divided into sections, where a number of very interesting exhibits were shown.

The General Electric Company showed a number of new heating and cooking devices, new high-efficiency lamps, and the latest improvements in metallized filament lamps with Holophane shades. The company was represented by its host of good fellows, including W. J. Hanley, H. B. Goodloe, of Columbus; J. B. Pevear, H. C. Houck, A. H. Meirose, L. R. Dunkle, A. E. Alley and R. W. Palmer, of Cincinnati; A. S. Hertz, Cleveland; H. J. Mauger, C. F. Conn and N. R. Birge, of Schenectady; F. W. Willcox and G. C. Osborn, Harrison, N. J.

EXHIBIT OF THE BRILLIANT ELECTRIC COMPANY, AT THE CONVENTION OF THE OHIO ELECTRIC LIGHT ASSOCIATION, PUT-IN-BAY, AUGUST 21, 22 AND 23.

The Westinghouse Electric and Manufacturing Company had an elaborately decorated exhibit in one of the parlors, just off the main reception room. Their blue silk banners were a conspicuous adornment of their headquarters. The company exhibited a line of portable instruments, direct-current, single-phase and polyphase wattmeters, arc lamps for all circuits, and fan motors—ceiling and desk types. On behalf of the Sawyer-Man Electric Company the Westinghouse company distributed an incandescent lamp dictionary. In addition to the other literature of the company the book of Westinghouse views was greatly appreciated. The company was represented by George B. Dusinberre, R. W. Beebe, C. O. Baker and C. P. Billings, of Cleveland; J. W. Schrantz and J. A. Brett, Cincinnati; T. L. Schrantz and H. C. Marsh, Cleveland; W. F. Fowler, J. C. McQuiston and J. H. Wagenhorst, Pittsburg.

The Brilliant Electric Company had a handsome exhibit of the Brilliant tantalum and Brilliant "Gem" high-efficiency lamps. This exhibit, when lighted up in

the evening, was very generally admired. A feature of the exhibit which attracted a great deal of attention was the "Gem" tipless lamp in process of construction. The method of exhausting the Brilliant tipless lamp through the stem was the centre of a good deal of attraction. The company wes represented by E. J. Kulas, secretary and general manager; R. S. Jackson and E. V. Hennecke, who is in direct charge of the tantalum and "Gem" lamp departments. The company distributed a unique souvenir in the form of a small cigar enclosed in a 110-volt sixteen-candle-power tipless bulb, the base of which was cemented as in regular practice.

The Lafayette Electrical Manufacturing Company exhibited its new transformer, the exhibit being presided over by William Hornberger, the designer of this apparatus.

The Allis-Chalmers Company's exhibit consisted of induction motors, air-compressor and brake appliances, turbine blading, and a full line of literature. The company was represented by F. C. Colwell, Cincinnati; Clay Sprecher, Cleveland, and George A. Williams, Milwaukee.

The Phelps Company showed a number of advertising novelties, including the "Wink" sign frame, "Skedoodle J" turndown lamps, and the winking owl and dog. The company was represented by W. J. Phelps and F. T. Benson.

The Wagner Electric Manufacturing Company made a choice display of switchboard apparatus, portable indicating instruments, and single-phase elevator motors. The company was represented by C. E. Delafield, manager of sales; Walter Robbins, St. Louis; Dean Emerson, Cincinnati, and L. B. Hoit, of Cleveland.

The Electric Appliance Company showed a line of "Sangamo" motors, "Gem Zenith" and "Gem Packard" lamps. Represented by P. R. Boole and George R. Porter, Chicago.

The Nernst Lamp Company made an exhibit of its series street-lighting system, using the Nernst lamp in conjunction with arc lighting. Represented by Max Harris and S. P. Wilbur, Pittsburg; J. F. Hoover, Cincinnati; James L. Anderson, Columbus, and Charles H. Davis, Chicago.

The H. W. Johns-Manville Company exhibited a comprehensive line of oil switches, cutouts, service and subway boxes, fuse boxes and "Sachs Noark" fuses and fuse blocks. Represented by R. R. Braggins and H. McKinley, Cleveland.

The Simplex Electric Heating Company exhibited a line of household, laundry and tailors' irons, cooking utensils, including a chafing-dish outfit and quick-heating water cups, soldering and curling-iron heaters, dentist's sterilizer, and a glue pot and heating pads. This exhibit was in charge of I. W. Reynolds.

The Pittsburg Transformer Company showed a line of Pittsburg transformers and distributed some attractive literature. The exhibit was in charge of H. G. Steele, secretary, Pittsburg, Pa.

Among others who were present were J. C. Fish, president, and R. G. Van Horn, of the Shelby Electric Company. This company distributed a valuable souvenir in the form of a pocket receptacle containing court plaster neatly arranged in various shapes.

The Fort Wayne Electric Works—A. A. Serva and George B. Edgar.

Erner-Hopkins Company—W. A. Hopkins and H. B. Rogers.

Sangamo Electric Company—J. H. Hodde.

Curtis Advertising Company—C. H. Johnston and C. A. Parker.

National Carbon Company—N. C. Cotabish, A. B. Pyke and A. G. Summerell.

C. W. Lee Company—Frank B. Rae, Jr., secretary.

The Hoit Engineering Company—L. B. Hoit and C. B. Kelley.

W. J. Barr Electric Manufacturing Company—Thomas E. Barr, W. J. Barr and George R. Craven.

Bryan-Marsh Company—Fred W. Godfrey.

Doubleday-Hill Electric Company—Elliott Reynolds.

Fisher Electric Company—H. O. Fisher, manager.

Consumers' Rubber Company—J. N. Kirby.

Cleveland Electrical Supply Company—H. H. Cudmore and W. C. Marker.

F. Bissell Company—F. Bissell, F. M. Knierim and A. F. Knierim.

New York & Ohio Company—Robert E. Gorton.

Cleveland Window Glass Company—R. P. Anthony.

Erner Electric Company—F. R. DuGuay.

Osburn Flexible Conduit Company—W. P. Ambos and J. L. Carlton.

John A. Roebling's Sons Company—J. W. Brooks.

Post-Glover Electric Company—E. L. Van Winkle.

F. D. Lawrence Electric Company—C. S. Nolloth and P. J. Williams.

Benjamin Electric Company—S. R. Fralick.

Stanley-G. I. Electric Manufacturing Company—Oscar Carman.

Barney Electrical Supply Company—Thomas H. Harris.

W. G. Nagel Electric Company—A. J. Carney.

Cleveland Library Bureau—T. E. Crawford.

Buckeye Electric Company—F. Bliss.

J. Robert Crouse was kept busy talking about the progress of the work of the Co-operative Electrical Development Association. This work has been taken very closely to heart by the Ohio central station men and Mr. Crouse's representations were very much appreciated and earnestly endorsed.

A rejuvenation of the Sons of Jove was scheduled for Wednesday evening, but this was omitted, and in the early part of the evening an impromptu concert was given in one of the spacious parlors under the general direction of E. J. Kulas. Several splendid tenor solos were rendered by C. A. Parker, of the Curtis Advertising Company, and Mr. Kulas and J. L. Carlton also responded. The entertainment, however, was broken up by the announcement of dancing, which, although held under more or less distressing circumstances because of the hot weather, was appreciated and attended by many of those present.

Electric Power to Rid London of Smoke.

A plan has been proposed by Arnold Lupton, a member of the British Parliament, the object of which is to do away with the burning of fuel in London. The plan contemplates the use of electric power for heating, lighting and cooking in London, the power to be brought from the coal fields of the Midlands. In this way all furnaces and smoke producers will be driven from the city. It is estimated that the smoke nuisance causes actual damage every year amounting to about $10,000,000, and this does not include any allowance for the personal discomfort which it causes. The idea is not only to do away with this nuisance, but to supply the power on such a scale that it will be a cheap substitute for the present source of light, heat and power.

The plan proposed contemplates the transmission of electrical energy from the Midland coal fields, 120 miles away from London, at 60,000 volts. The average power to be supplied is about 1,000,000 kilowatts. Mr. Lupton estimates that, if done on this scale, power could be delivered in the city at one-half cent per kilowatt-hour and could be delivered in small quantities at a rate of two cents and in larger quantities for less. It is also estimated that it will cost about $17,000,000 to make a beginning. Mr. Lupton thinks that this would make London one of the sunniest cities on the globe, as well as the most beautiful city in the world.

A Visit to the Power-Houses of the Brooklyn Edison Electric Illuminating Company.

The Edison Electric Illuminating Company, of Brooklyn, N. Y., extended an invitation to all the electrical contractors of that city to visit its two great power-houses at the foot of Gold street, and Sixty-sixth street and New York bay, on Thursday of last week. The response included virtually the entire list of contractors of that borough. The trip was made in automobiles, and a dinner was served at Luna Park, Coney Island, in the evening. Starting from the Edison club rooms, a new and promising institution of the illuminating company in the Johnson Building, Brooklyn, the first visit was made to the Gold street station, which was found to be undergoing rapid and very complete expansion. The party then went to the Bay Ridge station and from there to Coney Island.

The attendance included Vice-President and General Manager W. W. Freeman and several of his associates, among whom were J. Becker and M. S. Seelman, Jr. Mr. Freeman presided at the banquet, and at its conclusion delivered a very interesting little talk respecting the agreeable cooperating relations existing between the illuminating company and the contractors, and alluded at some length to the growth of the lighting facilities in Brooklyn.

The Edison Electric Illuminating Company of Brooklyn began business on September 2, 1889, at 360 Pearl street, and supplied the first incandescent lamp system in Brooklyn. The company's generating equipment at that time consisted of two 250-horse-power engines, each belted to two 100-kilowatt dynamos on the floor above. This apparatus, with the low efficiency lamp then in use, would furnish current for about 7,000 lamps.

The two principal generating stations of the Brooklyn Edison Company to-day are located at the foot of Gold street, and at Sixty-sixth street and New York bay. They supply electrical energy to a connected load, which on August 1, 1906, equalled an equivalent of 1,052,380 sixteen-candle-power lamps, in addition to which uncompleted installations had been contracted for exceeding 75,000 equivalents.

Extensive alterations, additions and extensions are being made at the Gold street station of the company, and when these are completed and generating apparatus already ordered or planned for installed, this will be one of the most modern and important electric power-houses in the country, with a capacity exceeding 85,000 kilowatts, which would be sufficient to meet the maximum demands of a connected load amounting to 4,250,000 sixteen-candle-power incandescent lamps.

The improvements already made or anticipated at the Gold street station, briefly stated, are as follows:

The roof of the operating room has been raised eighteen feet. The station has been entirely remodeled, the walls practically rebuilt, and two wide mezzanine galleries added. A seventy-five-ton traveling crane and runway has been installed. The installation of an Allis-Chalmers horizontal

ELECTRICAL CONTRACTORS' VISIT TO THE POWER-HOUSES OF THE BROOKLYN EDISON ELECTRIC ILLUMINATING COMPANY—PHOTOGRAPH TAKEN IN FRONT OF BAY RIDGE STATION OF THE EDISON ELECTRIC ILLUMINATING COMPANY, OF BROOKLYN.

steam turbine, capable of generating 8,000 kilowatts. This is now in operation. Within a month a Westinghouse turbine of the same type and capable of generating 11,000 kilowatts will be in commission at this plant, and a third turbine of the larger size will be installed in 1907. More turbines will be added from time to time, as the demands of the system warrant, until the ultimate capacity of the new station equipment, 85,000 kilowatts, is reached.

An entirely new condensing water system has been constructed, consisting of concrete intake and overflow tunnels, and connections to these, made ready for the installation of the condensing apparatus of the turbines. Two of these units are now connected.

On the water front an entirely new dock and bulkhead has been constructed, and on this deck a complete system for the rapid and efficient handling of coal and ashes is being installed. The coal-handling system consists of two towers equipped with engines for hoisting and crushing the coal, hoppers for distributing the coal to cars, and a cable runway for handling the cars and conveying the coal to the bunkers, from which it passes through chutes as needed to the boiler-room floor. This system, when complete, will be able to deliver coal to the bunkers at the rate of 250 tons per hour.

The ash-handling system consists first of runways in the boiler-house basement, on which are operated cars receiving the ashes from the hoppers under each boiler. The ash cars deliver their loads to a vertical conveyor, which takes the ashes up and delivers them into the ash pocket on the dock. From here they are dumped directly into scows and towed out to sea.

During the coming year the old building back of the present station and extending through to John street will be torn down, and foundation laid for a new boiler-house, which will contain, eventually, 52,000 boiler-horse-power. It is expected to install sixteen of the ultimate eighty boilers at first, and to add to these as the need of steam for turbines develops.

The cost of the Gold street equipment already installed or ordered, and of the work completed, under way and contracted for, will exceed $2,500,000. This, as well as the further and very heavy recent expenditures at the Bay Ridge power-house, and for substations and extensions to the system, is an investment of capital by the stockholders of the company, following a broad-gauge policy which looks to future developments in Brooklyn to return a reasonable revenue on the money invested. These vast sums are being expended to provide the company's customers with a service as nearly perfect as possible, and to make adequate provisions for the increased business which will unquestionably result from the growing popularity of electricity in its light and power manifestations and the rapid and continuous development of the borough of Brooklyn as a residential, mercantile, manufacturing and commercial centre.

At the Bay Ridge power-house $750,000 has been spent during the past three years in improvements and additions. These include the installation of an additional 5,000-horse-power vertical cross-compound engine, direct connected to a three-phase alternating-current generator, capable of generating 3,750 kilowatts of current, one of three of this type and size now in use, in addition to smaller units at this station. Also a new boiler-house and boilers, a new steel coal hoist, pocket, endless-chain bucket-conveyor and cable railway, and new intake tunnels for condensing purposes. The total capacity of the Bay Ridge power-house exceeds 14,000 kilowatts.

The current as generated is alternating, three-phase, twenty-five cycles, 6,600 volts. The output is delivered to the fourteen substations of the company scattered throughout the borough. In alternating-current districts it is there stepped down to 2,400 volts and sent out along primary feeders to individual transformers, and there again reduced to standard consumption pressure, 115 volts for lighting and 230 volts for power. In direct-current districts primary current at 6,600 volts is stepped down at the substations to either 87 or 174 volts alternating, and converted in rotaries to 115 or 230 volts direct, and as such distributed to the mains.

At six of the substations, Pearl street, Rockwell place, Myrtle avenue, Sumpter street, Ainslie street and Atlantic avenue, are located storage batteries. This equipment is in the nature of a reserve and to provide a positive assurance against interruption of service on direct-current circuits. These batteries are not, however, the only provision against extraordinary emergencies, for the company's generating plants are so connected that in case of difficulty with any one unit its load is automatically transferred to the others.

As a matter of statistics, the Edison company's distributing equipment includes 556 miles of underground cable and 1,327 miles of overhead wires.

A photograph of the party, taken in front of the Bay Ridge station, is reproduced on the opposite page.

The contractors present were: F. A. Armstrong, Addison W. Brown, Frank G. Blanchard, A. S. Beach, Howard W. Bishop, C. H. Clarke, Henry Fallek, A. E. Greene, M. J. Hanson, William Hirkenstein, William Huth, John L. Kruger, Mr. Kebbe, Mr. Lillianstein, Peter J. Minch, P. O'Rorke, I. I. Prevost, M. R. Rodrigues, F. J. Rhoades, Eugene B. Stratton, Charles A. Soper, E. J. H. Thiemer, A. Weiderman and F. H. Ward; and representatives of the following companies: Acme Electrical Construction Company, Bateman & Miller, Peter Quinan & Company, Harding & Roth, Kent Grete Electric Company, Levine Electric Equipment Company, LeManquis Electrical Manufacturing Company, E. Murphy & Son, R. Manquis & Sons, George Weiderman Electric Company and R. J. Ward & Son.

The Convention of the Association of Edison Illuminating Companies.

The convention of the association of Edison illuminating companies will be held at the Hotel Frontenac, Thousand Islands, N. Y., on Tuesday, Wednesday and Thursday, September 4, 5 and 6.

In addition to the executive session and various forms of entertainment the following programme has been announced:

"Costs of and Results from Advertising and Soliciting," H. K. Mohr, Philadelphia, Pa.

"Details and Costs of an Inexpensive Underground System for Alternating Distribution in the Semi-Suburban Residence Districts of a Large City"—a symposium of short papers by the underground experts of the large companies—W. T. Morrison, New York; Wm. C. L. Eglin, Philadelphia; D. W. Ropes, Chicago; Sidney Hosmer, Boston.

"Adjuncts to the Power Load," C. J. Russell, Philadelphia.

"Investigation of Various Losses in the Electrical System of the Edison Electric Illuminating Company of Boston," L. L. Elden, Boston.

"Recent Developments in Incandescent Lamp Manufacturing," F. W. Willcox, Harrison, N. J.

"Various Types of Lamps and Practical Hints on Illumination," Steven B. Burrows, Brooklyn.

"The Isolated Plant Question," M. F. McAlpin, New York.

"Alternating-Current Motors for Various Purposes, with Especial Application to Elevators," E. W. Lloyd, Chicago.

"Evening Talk with Stereopticon Illustrations," W. S. Andrews, Schenectady.

"Legislative Influence on Income Through the Meter," Caryl D. Haskins, Schenectady.

"A Brief Report on Municipal Ownership," Arthur Williams, New York.

The Convention of the American Street and Interurban Railway Association.

The annual convention of the American Street and Interurban Railway Association will be held at Cleveland, Ohio, October 15, 16, 17, 18 and 19. The executive committee will probably be located at the Southern Hotel and the Hartman will likely be the headquarters for the ladies of the convention.

The Central Passenger Association has granted an application for reduced fare, as have the Trunk Line Association and the Southeastern Passenger Association.

The Manufacturers' Association will have a very comprehensive exhibit, 135 different companies having already been assigned exhibit space.

Those in charge of the entertainment features of the convention will have some announcements to make in the near future. It is expected that there will be a theatre party on Wednesday evening, and that the annual banquet will be held on Thursday evening. In addition, there will be interurban trolley parties, automobile rides, golfing and a number of other forms of amusement, most of which will be especially arranged for the ladies of the convention.

The convention will be held at the Ohio State Fair grounds, where suitable halls are available, conveniently situated with respect to the exhibit of the Manufacturers' Association.

The programmes for the sessions of the American Street and Interurban Railway Association and the Engineering Association are given below, and in addition to the meetings of these associations the Railway Accountants' Association and the Claim Agents' Association will hold forth during the week.

AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.

WEDNESDAY, OCTOBER 17, 10 A. M. to 12.30 P. M.—Convention called to order; address of welcome; president's address; report of executive committee; report of secretary and treasurer; addresses by presidents of affiliated and allied associations; announcements; new business.

WEDNESDAY, OCTOBER 17, 2 P. M. to 4.30 P. M.—Reports of committees: (a) membership; (b) compensation for carrying mail; (c) subjects; (d) car wiring; (e) standardization of equipment; (f) insurance; (g) promotion of traffic.

THURSDAY, OCTOBER 18, 10 A. M. to 12.30 P. M. (Interurban Meeting).—Report of committee on heavy electric railroads. Paper—"Elevated Railways and their Bearing on Heavy Electric Traction," by H. M. Brinckerhoff, consulting engineer, New York city. Paper—"Electric Railways in Sparsely Settled Communities," by E. P. Roberts, of the Roberts & Abbott Company, Cleveland, Ohio. Paper—"Interurban Limited Trains," by Harrie P. Clegg, president Dayton & Troy Electric Railway Company, Dayton, Ohio. Paper—"Interurban Freight and Express," by E. C. Spring, general manager Dayton, Covington & Piqua Traction Company, West Milton, Ohio. Paper—"Tickets and Rates," by F. W. Coen, secretary and treasurer Lake Shore Electric Railway Company, Cleveland, Ohio. Paper—"Some Distinctions Between City, Suburban, Interurban and Railroad Traffic," by Theo. Stebbins, expert, National Civic Federation, Cohasset, Mass. Appointment of nominating committee.

THURSDAY, OCTOBER 18, 2 P. M. to 4.30 P. M. (Employés' Meeting).—Report of committee on rules. Paper—"Y. M. C. A. Branches," by E. M. Willis, railroad secretary international committee of Y. M. C. A., New York city. Paper—"Selection of Trainmen," by C. E. Learned, superintendent of inspection Boston Elevated Railway Company, Boston, Mass. Paper—"Discipline of Trainmen," by F. W. Brooks, assistant general manager Detroit United Railway, Detroit, Mich. Paper—"Uniforms and Badges," by John R. McGivney, purchasing agent New Orleans Railway and Light Company, New Orleans, La.

FRIDAY, OCTOBER 19, 10 A. M. to 12.30 P. M. (Executive Session).—Report of committee on municipal ownership; report of committee on public relations. Paper—"Handling Public Complaints," by John A. Beeler, vice-president and general manager Denver City Tramway Company, Denver, Col. Paper—"Leaks Between Passenger and Treasurer," by A. H. Stanley, general superintendent Public Service Corporation of New Jersey, Newark, N. J.

FRIDAY, OCTOBER 19, 2 P. M. to 4.30 P. M.—Report of nominating committee; election of officers; resolutions; unfinished business; adjournment.

AMERICAN STREET AND INTERURBAN RAILWAY ENGINEERING ASSOCIATION.

MONDAY, OCTOBER 15, 10 A. M. to 12.30 P. M.—Registration; convention called to order; address of welcome; address—Hon. W. Caryl Ely, president American Street and Interurban Railway Association; address—Prof. Bernard V. Swenson, secretary and treasurer American Street and Interurban Railway Association; reading of the minutes of the last meeting; address of the president; annual report of the executive committee; annual report of the secretary and treasurer; appointment of convention committees.

MONDAY, OCTOBER 15, 2 P. M. to 5 P. M.—Report of special committees; report of committee on control apparatus; report of committee on maintenance and inspection of electrical equipments; paper—"Ballast," by Charles H. Clark, engineer maintenance of ways Cleveland Electric Railway Company, Cleveland, Ohio; report of committee on way matters; paper—"Ties, Poles and Posts," by C. A. Alderman, chief engineer, Cincinnati Traction Company, Cincinnati, Ohio.

TUESDAY, OCTOBER 16, 10 A. M. to 12.30 P. M.—Report of the committee on standardization. Paper—"Gas Engines," by Paul Winsor, chief engineer motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass. Paper—"Underground Cables," by H. G. Stott, superintendent motive power Interborough Rapid Transit Company, New York, N. Y.

TUESDAY, OCTOBER 16, 2 P. M. to 5 P. M.—Paper—"Economy of Car Equipment, Weights and Schedules," by E. H. Anderson, Schenectady, N. Y.; discussion of the question box.

TUESDAY, OCTOBER 16, 8 P. M.—Informal reunion and dinner.

WEDNESDAY, OCTOBER 17, 10 A. M. to 12.30 P. M.—Joint meeting with "American" Association.

WEDNESDAY, OCTOBER 17, 2 P. M. to 5 P. M.—General business; election of officers.

New York, New Haven & Hartford Railroad Trolleys Sold.

It has been announced that the New York, New Haven & Hartford Railroad has disposed of its entire group of trolley lines to a voluntary association. The new association which now owns the trolley systems is to be known as the New England Security and Investment Company. It is understood that the sale or transfer involves all of the railroad company's holdings. This means about 600 miles of completed trolley lines in Connecticut, Massachusetts, Rhode Island and New York.

The lines in Connecticut form the largest group, fully seventy-five per cent of the entire street-railway system in that state having belonged to the New York, New Haven & Hartford Railroad. This includes the street railroads of Hartford, Willimantic, New London, New Haven, Bridgeport, Stamford and Norwich. In Massachusetts the holdings include the systems in Springfield and Worcester, the Berkshire Street Railway, and the Worcester & Southbridge Street Railway, as well as the Worcester & Blackstone Valley Street Railway.

A New Ozone Water-Sterilizing Equipment.

By Frank C. Perkins.

THE accompanying illustrations show the apparatus and methods of operation of a new system for the sterilization of water by means of ozone, electrically produced, this equipment having been constructed at Berlin, Germany, by the Siemens-Schuckert Company.

This apparatus is so arranged that a military outfit can be packed upon wagons for transportation in order that the troops in the field or at military stations may be provided with sterilized water for drinking purposes.

For military purposes it is of especial importance that the troops be supplied in the field with pure water, and this electrical apparatus may be connected with any ordinary direct-current circuit, thus supplying the necessary ozone for purifying the water.

A glass sterilizing column is utilized, about sixteen inches high, the ozone apparatus being mounted in a wooden case. A water inlet and exit is provided at the top and bottom of the column which is filled with small porcelain, clay or glass balls and is equipped with a differential gauge and a measuring tube having a throttling valve, this arrangement determining exactly the amount of ozone passing through the column by noting the data on a standardized table.

A ten-piece Siemens glass-tube ozone device is provided within the case, together with a transformer and a small direct-current motor, operating a small blower utilized for forcing the air through the ozone apparatus. A rotating circuit-breaker is employed which provides the necessary interrupted direct current for the primary coils of the transformer, and a wash bottle is utilized for drying the air by means of calcium chloride or sulphuric acid. A vertical switchboard is provided with the necessary switches and regulating resistances for the motor circuit, as well as the transformer primary interrupted direct-current circuit.

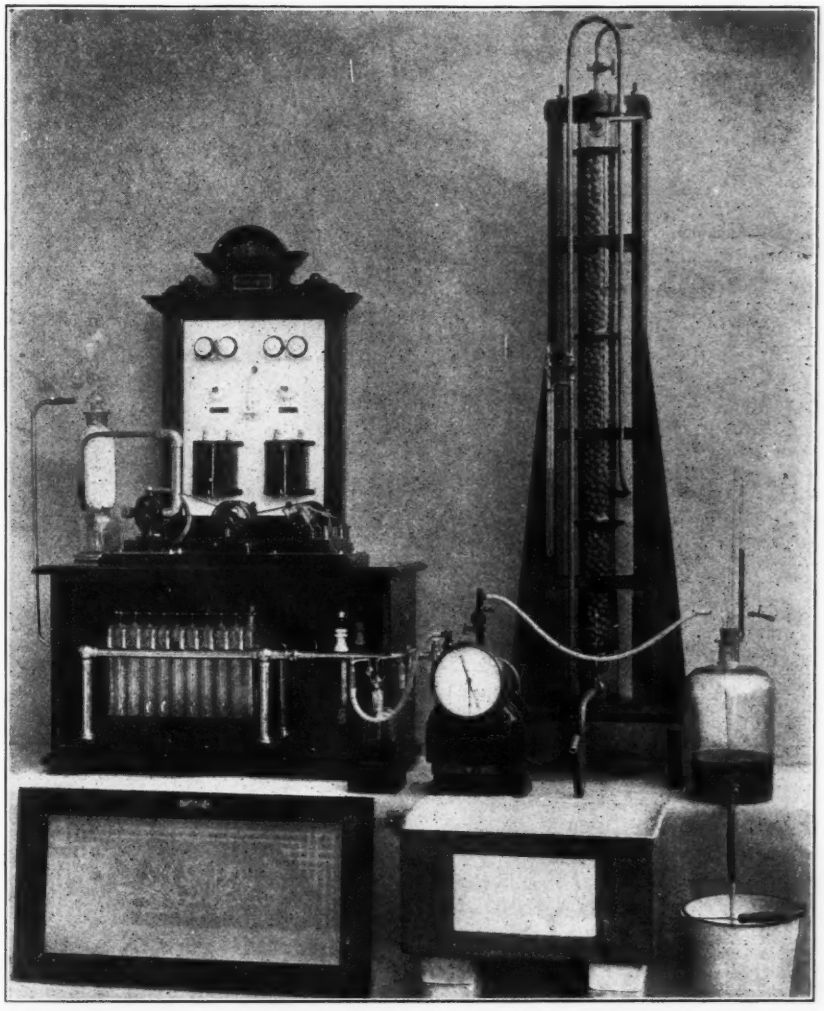
The Siemens ozone tubes consist of concentric glass cylinders, one placed within the other, and fused together at the top. The outer one is placed in cooling water, while the inner one is filled with water, this being utilized as a conductor of the high-tension current to the discharge poles of the ozone apparatus.

Where alternating current is available only, motor-generators are provided, a small direct-current dynamo supplying the necessary continuous current to the transformer, this dynamo being operated by an alternating-current motor of about one-half horse-power in the main supply circuit.

The motor-generator set is first placed in operation, and when the interrupter is rotating in a proper manner the circuit is closed to the transformer. The proceeding is reversed in stopping the process, the transformer circuit being first opened, and then the motor circuit being opened at the switchboard.

About one-half horse-power is required for operating the laboratory installation, which furnishes 130 to 260 gallons per hour. To determine its concentration, about six grammes of the ozone are tested by introduction into a slightly acid solution of potassium iodide. It is held that if pure oxygen be passed through the apparatus instead of air, the output is several times as great.

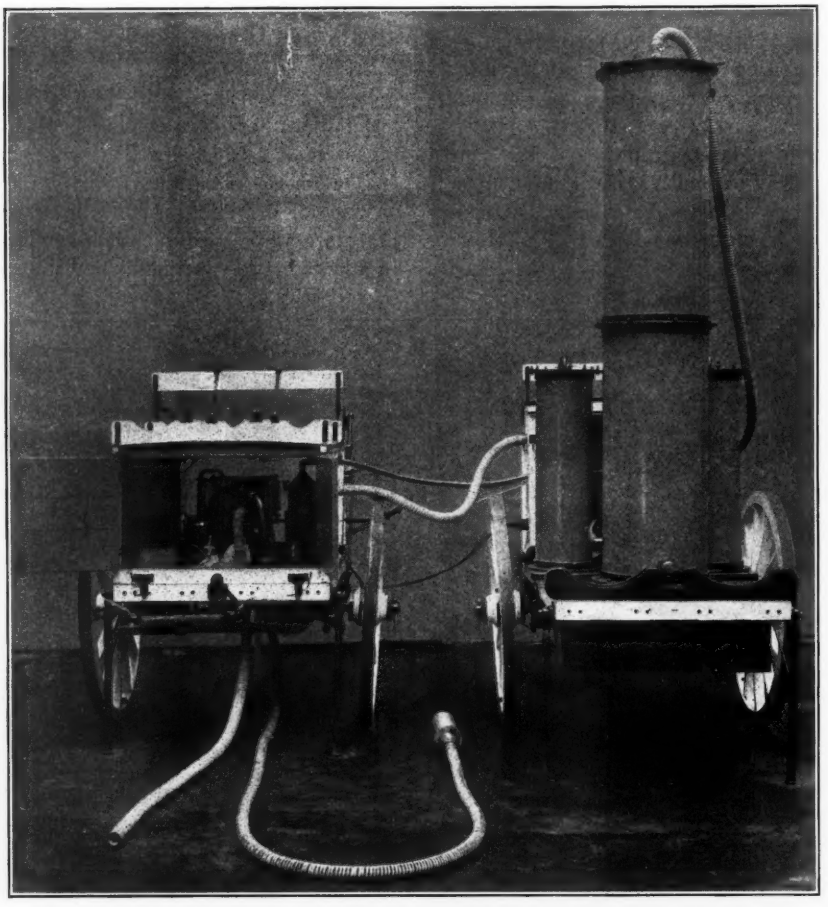
In St. Petersburg and in Munich, ozone installations have been employed, producing as high as 25,000 gallons per hour. In the former plant the sterilized water is used for drinking purposes in its natural state, while at Munich it is employed in a large brewery, while mineral water is being sterilized by ozone at a plant in Astrakhan.



SIEMENS-SCHUCKERT ELECTRIC OZONE WATER-STERILIZING APPARATUS.

During the recent war in Manchuria the Russian army was provided with portable sterilization outfits, and these equipments are also in use for military service by other European governments for supplying water to fortifications and in military camps. A special wagon is provided with motors, generator and sterilizing ap-

paratus, the power being supplied by gasolene or alcohol engines, directly connected to a generator. A small rotary water pump

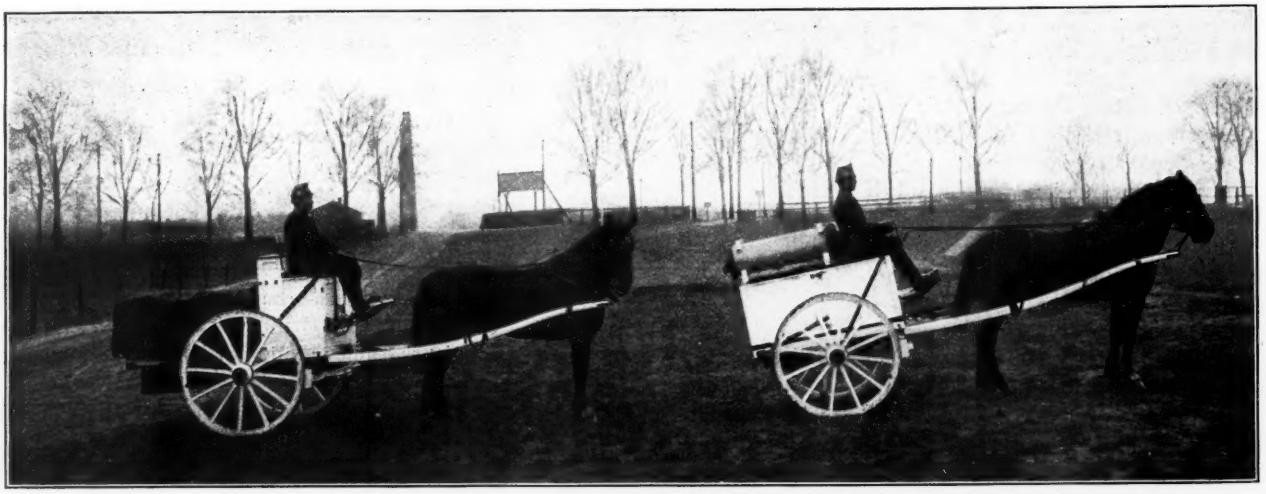


Portable German Military Electric Ozone Water-Sterilizing Outfit.

is provided to draw the feed-water from the source of supply, and force it into the sterilizing column, and a small blower is used to supply the air for the ozone apparatus, the air being previously dried by passing it through calcium chloride. There are two spring-supported Siemens ozone cases mounted on another sterilizing vehicle. This equipment includes eight ozone tube elements and a transformer under the ozone apparatus for the production of the high-tension current from the low-tension primary alternating current supplied by the cable from the machine wagon. There are three parallel rapid filters provided also, consisting of metal cylinders in which are placed closed filter bags through which the feed-water is forced before it is pumped into the column, and is thus largely freed from suspended impurities. A cylindrical metal sterilizing column about eight feet in height is used filled with pieces of cement-covered pumice stone about the size of small pebbles. This column is arranged in two parts, each having a perforated space, and placed one upon the other, which permits the parts to be taken to pieces in sections easily, as they are joined by bolts.

This portable equipment weighs about a ton and produces about 800 gallons of pure water per hour. The engine which drives the small alternating-current dynamo is of about two horse-power. Such a large amount of ozone is produced that even though the water be in a very bad condition it is thoroughly sterilized. This is worked so as a matter of precaution, a very much greater amount of ozone being produced than is really necessary in order to ensure pure sterilized water for drinking purposes.

One of these outfits was utilized in one of the great military camps at Harbin during the recent Russian-Japanese war and is said to have given excellent satisfaction. Each of the military wagons is hauled by a single horse and weighs about a ton. Under ordinary conditions this plant supplies from 75 to 100 cubic feet per hour. The simplicity of operation and ease with which a plant of this design can be transported makes it of special importance for use in army service, as pure water is one of the first requirements in military camps.



German Ozone Water-Sterilizing Apparatus on Wagons Ready for Transportation to Army Camps.

International Association of Municipal Electricians.

Report of the Eleventh Annual Meeting held at New Haven, Ct., August 15, 16 and 17.

THE eleventh annual convention of the International Association of Municipal Electricians was held at New Haven, Ct., August 15, 16 and 17.

The meeting was called to order by President Jerry Murphy, of Cleveland, Ohio, at 10.30 A. M. on August 15, and after an invocation by the Rev. Mr. Knight and addresses of welcome by the mayor, the Hon. J. P. Studley, and the governor of Connecticut, the Hon. Henry Roberts, with responses by A. S. Hatch and J. B. Yeakle, the usual business was taken up.

The president's address had for its theme the duties of a city electrician. Following his address Mr. Murphy read a paper on the "Advisability of Placing the City Electrician Under Civil-Service Rules." He expressed himself as being in favor of the plan, as in his opinion it would cause a better class men to seek the position.

In the discussion which ensued it was shown that some members did not favor the present systems of examination and of enforcement of the civil-service rules. They should be so amended as to eliminate politics.

A resolution was introduced and carried appointing a committee to investigate the matter and report at the next convention. A. S. Hatch, W. M. Petty and C. R. George comprise this committee.

The appointment of the nominating committee and the reading of certain communications closed the morning session.

In the afternoon the members took up matters relating to electric light and power, A. S. Hatch, of Detroit, making a report, which was discussed by Messrs. Petty, Bradshaw, Smith, George, O'Hearn and others.

Mr. Hatch also read a paper on "The Trackless Trolley," following which questions in the Question Box relating to electric lighting were taken up.

They were as follows:

"How are 'outs' reported and what record is kept of them? What notices are given the company?"

"Do you prefer mast arms or centre suspension in order to put the lamp in the centre of the street? With the former the lamp is not quite in the centre and with the latter there are two poles instead of one in the street."

"What restrictions are made in the disposal of broken globes and carbon stubs? How badly broken may the globe be before it must be changed?"

"What constitutes dark and moonlight nights? If the night is cloudy though moonlight, can you compel the lights to be turned on?"

"What methods are adopted to know the company is furnishing full current to the circuits?"

Regarding the reporting of "outs," the system adopted in the smaller towns was to have the police report the lamps out on their beats. This was then reported to the electric light company, which usually made it a practice of having men on duty to a late hour of the night to take care of such outs.

Mast-arms were considered the better means of suspending arcs wherever the streets were not heavily wooded. In such places the centre suspension was the better, although it had the disadvantage of requiring two poles.

The practice of throwing broken globes in the nearest lot as is done by some trimmers should be stopped. Many cities made it an offence punishable by fine for such practices.

The Philadelphia schedule was considered the best for places desiring a moonlight schedule. Most towns prefer the 4,000-hour schedule.

Regarding the methods adopted for knowing whether the company was furnishing full current to the circuits, it was the consensus of opinion that a periodical reading with a meter was the only practical method.

The evening was devoted to the consideration of the matters connected with the inspection department of the association. T. C. O'Hearn reported on a code, and a paper was read by C. R. George, of Houston, Tex., on "Conditions Surrounding the Inspection of Wires in the Southwest." This was discussed by Mr. Smith, of Norfolk, Va., who referred to several rules adopted by his city, among them those imposing a fine on carpenters and other craftsmen who interfered in any manner with the wires in buildings.

J. B. Yeakle said that in his opinion it was criminal neglect on the part of a municipality to permit poor installations of electrical apparatus.

Questions in the Question Box relative to the topic were then discussed. They were:

"What restrictions are placed on running services, particularly telephone and electric light services from distributing poles in the centre of the block with both classes of wires radiating in all directions, interlacing through each other?"

"What restrictions are placed on leakage of current from railway tracks to water pipes and what records are kept of such leaks?"

"What are the restrictions made concerning wires strung on buildings?"

"Who trims the trees, and what are the rules governing it?"

"Do any cities have an ordinance permitting or compelling pole lines being put on lot lines instead of streets and alleys where there are no alleys, or where they run in the wrong direction?"

These were answered by Messrs. Hatch, Brophy, Thompson, Smith, Bradshaw and others.

In his report for the aerial construction department Chairman W. Y. Ellett, of Elmira, N. Y., referred to the many improvements now being used in overhead construction, such as stronger and heavier material and means for keeping high and low-tension lines separate.

After a discussion by Messrs. Petty, Thompson, Gascoigne and others, bringing out many methods of ensuring good service in overhead work, the evening meeting adjoined.

Underground construction was the topic for the session of August 16, Louis Gascoigne, of Detroit, presenting his report on the subject and W. H. Thompson, of Richmond, Va., reading a paper entitled "Comparison of Underground and Overhead Wiring and the Relative Values of Single Rubber-Covered Wire and Lead-Encased Cable."

A question was also asked: "Is it not feasible to have a combined sewer and subway system, owned by the municipality, the subways to be rented to the public-service corporations?"

Discussing the above matters, Captain William Brophy gave some interesting history regarding the first attempt of the city of Chicago to put its wires under ground.

It was the consensus of opinion that all fire-alarm and police telegraph lines should be under ground, and the members favored both rubber and paper-encased wires for such cables.

It was decided that it was not feasible to have a combined sewer and subway system.

In the evening session of August 16 the subjects considered were fire-alarm

and police telegraphs. Reports were made by the chairman, J. B. Yeakle, of Baltimore, for the former, and T. F. Almon, of St. Louis, for the latter. Mr. Yeakle also read a paper entitled "Details of Certain Auxiliaries to Fire-Alarm Apparatus," and a paper by Adam Bosch, of Newark, N. J., was read, the title of the latter being "History of the Fire and Police Telegraph."

Questions relating to fire and police telegraph matters were:

"What is the most practical method of placing signal lights for police patrol boxes?"

"What would be a reasonable expense for the installation of such lights?"

Mr. Yeakle gave additional details of his systems of lighting fire-alarm boxes. The scheme had proved so successful that it was being extended throughout Baltimore. He uses eight-candle-power lamps enclosed in waterproof red globes and supplies the current to maintain the light from the nearest fire-house. He believes the cost does not exceed two cents per lamp per night.

Others expressed themselves as being in favor of some sort of distinguishing illumination of signal boxes at night. Mr. Petty said Rutherford, N. J., had red lamps installed on the same pole as the fire-alarm boxes, the lamps receiving current from the incandescent street circuits.

The morning session of August 17 was devoted to the business meeting. The following officers were elected for the ensuing year:

President—T. C. O'Hearn, Cambridge, Mass.

First vice-president—James Grant, New Haven, Ct.

Second vice-president—C. R. George, Houston, Tex.

Third vice-president—J. Berry, Indianapolis, Ind.

Fourth vice-president, W. H. Bradt, Troy, N. Y.

Secretary—Frank P. Foster, Corning, N. Y.

Treasurer—C. H. Diehl, Harrisburg, Pa.

Executive committee—A. D. Smith, Norfolk, Va.; J. B. Yeakle, Baltimore, Md.; William Crane, Erie, Pa.; Jerry Murphy, Cleveland, Ohio; W. H. Petty, Rutherford, N. J.; A. S. Hatch, Detroit, Mich.; W. H. Thompson, Richmond, Va.; C. F. McDonald, Ottawa, Canada.

Finance committee—L. W. Kittridge, New Haven, Ct.; C. E. Bradshaw, Charlotte, N. C.; W. D. Clayborne, Savannah, Ga.

Norfolk, Va., was selected as the next place of meeting.

During the convention exhibitions were made by the following companies:

Corning Glass Works, Corning, N. Y., an indestructible inner globe. After being used for some time in an arc lamp, and while still hot, this globe was plunged in cold water without cracking it. Also while in use the exhibitor would hold ice against it without causing it to crack.

The Gamewell Fire-Alarm Telegraph Company exhibited auxiliary fire-alarm forms of apparatus for the transmission and reception of alarms.

The Battery Supplies Company, Newark, N. J., exhibited its Gladstone-Lalande battery.

The Connecticut Auxiliary Fire-Alarm Company exhibited auxiliary fire-alarm apparatus of an improved type.

The Leeds & Northrup Company, Philadelphia, Pa., showed testing apparatus.

The Holtzer-Cabot Electric Company, Brookline, Mass., displayed many forms of telephone and other apparatus.

Stanley & Patterson, Incorporated, New York city, exhibited "Faraday" bells.

Telephones in Japan.

When a Japanese dies in Tokio one of the assets of his estate is his telephone, and the privilege of taking over the dead subscriber's instrument is worth, according to the Boston *Financial News,* just $400 to his heirs.

The government of Japan is interested in telephones for the reason that such instruments of communication are a monopoly in the little empire—a government monopoly. It is a fact of world-wide recognition that governments as a rule do not pay particular attention to industries which they may happen to possess a monopoly of—and this maxim is apparently true of Japan, though it is possible that Japanese telephone systems may be modernized.

The great complaint in Japan is not so much against the quality of the instruments and equipment of the systems as against the total inability of the government to supply service to all would-be subscribers. To get a telephone in Tokio a man either has to buy out a subscriber or wait his turn to secure an instrument, and there are no fewer than 8,000 people on the waiting list ahead of him.

The government is unable to supply the demand, for the simple reason that it has not the instruments, and has not the working force to install the telephones if it had them.

In Japan telephones are rented to subscribers at a flat rate; it makes no difference for what purpose they are used. A telephone for a private house costs just as much as one for a business office. In the city of Tokio, which has a population of a million and a half people, there are 22,000 telephone subscribers and thousands more who would willingly give $100 to secure accommodation.

The cost of a telephone in Tokio is $40 per annum, and that is gold, not silver, and the amount is payable strictly in advance. While the receipts of the government from its telephone monopoly are large, the cost of operations is comparatively light. For instance, it pays its linemen, the best of them, at the rate of fifty cents per day, and the nine-hour day has not yet been introduced in Japan. Switchboard operators are hired by the month, and they are paid $5 per month.

Notwithstanding the fact the net earnings from the telephone system of Tokio are very large and there is therefore every incentive to supply as many customers as possible, the government has so far found it impossible to keep even with the demand. In Tokio alone it is estimated that some four years will elapse before the government will be able to supply an instrument to the last man who puts his name on the waiting list. Of course many would-be subscribers die before their turn comes, and the man has the doubtful consolation of knowing that chances may throw an epidemic of disease among those on the waiting list, and, though he be spared, his chances of getting an instrument during his lifetime are immeasurably increased by the deaths of the others.

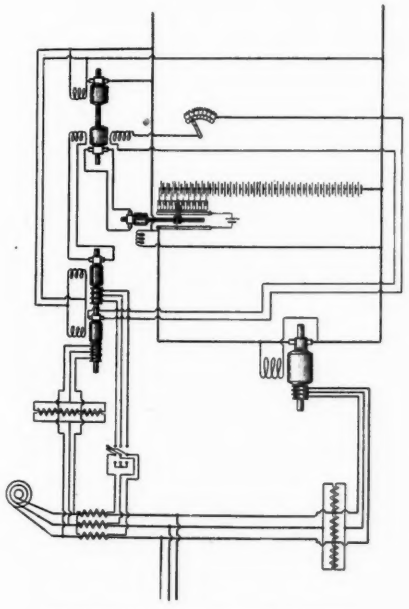
The Committee on Standard Rules of the American Street and Interurban Railway Association.

The committee on standard rules of the American Street and Interurban Railway Association has sent a data sheet to the general managers of the street and interurban railway properties of America. The committee desires to receive information as to whether the various companies have adopted the rules which were contained in the report submitted at the St. Louis Convention in 1904. The results of this investigation will form part of the committee's report which will be presented at the convention to be held at Columbus, Ohio, October 15 to 19.

The Independent Telephone Association of North Carolina and the Maine Independent Telephone Association have been organized within the last month. Both will affiliate with the International Independent Telephone Association.

Electrical Patents.

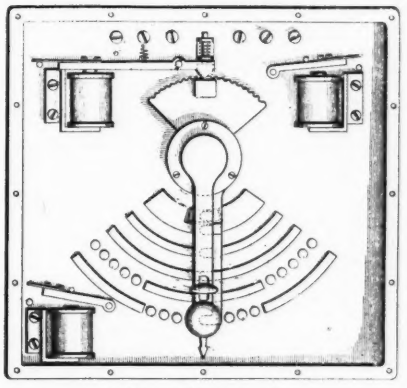
Albert S. Hubbard, Greenwich, Ct., has patented an electrical system of distribution (828,315, August 14). The invention relates to electrical systems of distribution, and more especially to systems in which there is an alternating-current generator connected through a rectifying device to a direct-current circuit in which is a battery connected across the circuit, and means are provided to automatically regulate the battery current. The object of the invention is to provide an efficient arrangement of apparatus to regulate the battery in accordance with the load on the alternating-current generator, and to this end is provided a special rectifying device which receives an alternating current that varies in accordance with the variations of load on the alternating-current generator, and causes the direct current from this rectifying device to energize or partly energize the field of a generator to govern the direction and intensity of the current from such generator. The current from this latter generator actuates a motor which operates in either direction to add to or remove



Electrical Distribution System.

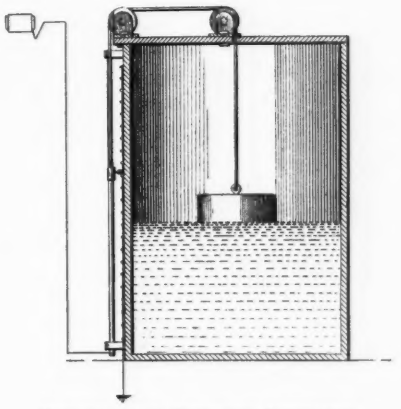
cells from the battery circuit. The combination of an alternating-current generator and a circuit therefrom, a direct-current circuit, a rectifying device between the two circuits, a storage battery across the direct-current circuit, a motor controlling the number of cells in the battery circuit, a dynamo connected with the motor to supply current thereto, a field-coil for the dynamo, a rectifying device receiving an alternating current that varies in accordance with variations of load of the alternating-current generator, and a circuit including the direct-current end of the dynamo.

Samuel D. Black, Sherwood, Md., has obtained a patent on a motor controller (828,637, August 14), which he has assigned to the Manufacturers' Engineering Company, Baltimore, Md. The principal object of the invention is to provide a controller for use with motors, especially in their application to the individual driving of machine tools and the like, though it may be used in any case where variable-speed motors are used and where it is desired that they shall be easily and quickly controlled. In one form of the invention, the functions of the starting box and speed controller are combined with safety devices, such as overload and underload cut-outs, and with an arrangement permitting the quick reversal of the direction of rotation of the motor without injurious sparking at the motor brushes. These are all controlled in the form of the invention shown in the patent by one handle without the use of any auxiliary handles or switches, thus enabling the operator to control the motor and the machine driven by it with one hand, and the whole is so enclosed in a dirt-proof case that it may be placed in any desirable position on the machine without danger of falling dirt or chips. An additional safety device is provided which prevents the operation of the machine on the starting resistances and which also prevents accidental starting in the event of the controller handle being struck by some portion of the operator's body or any passing object.



Motor Controller.

Michael C. Regan, United States Army, has patented an electrically operated indicator (828,570, August 14). This invention relates to improvements in apparatus for registering the movements of bodies, fluid or otherwise, at a point or points distant from the moving body being registered; and to this end the invention consists of means operated by the moving body and forming a contact for making and breaking an electric circuit controlling an electromechanical registering apparatus. In an electrical indicator, the combination with a shoe and means for operating same by the motion of the moving body being registered, of a plurality of contacts disposed in the path of travel



Electrically Operated Indicator.

of the shoe, a resilient connecting member attached to this shoe, the shoe comprising a pair of contact plates insulated from each other and from the connecting member, an indicator, electromagnets cooperating with the indicator to move it in reverse directions, and electric circuit wires interposed between the corelated contact plates of the shoe and electromagnets, substantially as described.

A Low-Resistance Glass.

At a meeting of Section A of the British Association, held recently in York, England, Charles E. S. Phillips described a glass which conducts electricity fairly well. This is obtained by fusing together sodium silicate and borax in the proportions of thirty-two of the former and eight of the latter. By adding one and one-quarter parts of Powell's flint glass to the mixture, greater stability is obtained and a better surface secured without any serious loss of conductivity. Such a glass is suitable for the cases or windows of electrostatic instruments. It may be cast into plates, but is not very workable on account of its low fusion point. It may, however, be drawn into rods or fibres, and takes a fine polish. It is somewhat harder than ordinary glass. The density is 2.49. It is transparent to X-rays, shows no fluorescence under cathode radiation, and is opaque to ultra-violet light. Its electrical conductivity is about 500 times that of the most conducting glass so far made. Its specific resistance is given as 10^9 ohms at twenty degrees centigrade. The glass may be powdered and fused onto clean copper, to which it adheres well without cracking. The resistivity of this glass changes markedly with its temperature.

Reviews of Current Engineering and Scientific Literature.

An Investigation of Auxiliary Apparatus for Determining the Mean Spherical and Mean Hemispherical Candle-Power.

In this article Dr. Berthold Monasch describes in detail a careful investigation into the merits of the spherical photometer suggested by Ulbricht, a brief description of which was given in the ELECTRICAL REVIEW for December 16, 1905. His results are given in both tabular and graphical form. He concludes as follows: In an Ulbricht sphere having a diameter of two metres, the indirect illumination at an observing window placed at any point is independent of the position of the source of light and of the distribution of light from this. A determination of the constant of the instrument is necessary for every type of lamp, if the source of light be more than ten centimetres below the top of the sphere or if the lamp be fitted with external reflectors. The covered hemisphere employed by the author gives also an intensity of illumination at the observing window which is independent of the position of the source of light and of the distribution, behaving just as an Ulbricht sphere. As the photometric integrator, any enclosed vessel of any form whatever may be used, provided that the light to be measured is entirely enclosed. —*Translated and abstracted from Elektrotechnische Zeitschrift (Berlin), July 19 and 26.*

Application of Unsymmetrical Magnetization of Iron in Alternating Currents.

A method of obtaining a static frequency transformer is described here by C. Léonard and L. Weber. The apparatus depends upon the magnetic saturation of iron, this property being employed to give a flux wave-form in which, during each half period, the flux falls to zero twice. The wave-form consists of two positive lobes, succeeded by two negative. This is obtained by means of two transformers having independent magnetic circuits. A circuit drawing its supply from a constant-potential source supplies current to two coils, one on each core, which produce magnetic saturation of the iron. There are, in addition, two primary coils, one on each core, which are connected in series across an alternating-current supply. The secondary winding consists also of two coils, one on each core, the two being in series. The action of this arrangement is as follows: Consider first one core alone thus magnetized by the direct-current winding mentioned above. As the alternating current increases during one-half cycle, the magnetomotive force set up will overcome that due to the direct current, if they be opposed, and thus reduce the magnetization to zero and carry it to an equal value in the opposite sense, if the relation between coils and currents be correct. As soon as the alternating current has reached its maximum value and begins to decrease, the direct-current winding begins to carry the magnetization back to its original value, which is reached when the alternating current again falls to zero. This corresponds to one-half cycle of alternating current, but a complete magnetic cycle for the core. During the following half cycle of alternating current the magnetomotive forces will be additive, but, due to the saturation of the iron, but little change will take place. During this half cycle of the alternating-current supply the secondary transformer core comes into play, having the same effect as the first; and since the two secondary windings are connected in series, the result is the superposition of two alternating-current electromotive forces, both unsymmetrical, but giving a symmetrical electromotive force having twice the frequency of the original supply. These simple relations hold only so long as the secondary be not loaded, for loading it introduces considerable complication. Another application of unsymmetrical magnetization which is suggested is to vary the inductance of a coil when it is undesirable to vary the number of turns in series. This may be done by adding a second winding and passing a direct current through this. By varying the direct current, a variation in magnetic flux will be brought about, thus causing a change in the inductance.—*Translated and abstracted from L'Éclairage Électrique (Paris), July 21.*

The Comparative Merits of Air and Electric Drills.

A comparison is made here between air and electric drills, by G. E. Palmer, considerably to the disadvantage of the latter. Invention has probably never won fewer and poorer rewards in proportion to the talent expended than those received by the designers of electric drills; and as the progress of the art during the last twenty years is analyzed, it seems to the author the difficulties presented to the designers of this form of apparatus are insuperable. The air drill seems to occupy a very secure position with regard to its retention as a standard form of apparatus, and it is quite remarkable that as a labor-saving device one of the most inefficient pieces of apparatus ever designed should have proved the most economical in its particular field. Drilling holes in rock is an operation in which an exhibition of bull strength and awkwardness is desirable, and this feature the air drill possesses to a remarkable degree. The jarring hammer blow transmitted to a cutting edge is the way of all ways for putting in rock holes of moderate depth, and for this class of work tools driven directly by air or steam are practically ideal, as all of the parts of the reciprocating piston that are liable to damage are easily protected from mechanical injury, and are so enclosed in a chamber of elastic and compressible gas that no damage results, even when sticking occurs. Although the electric drill with a short, rapid stroke cuts a cleaner and straighter hole, it does stick, with damaging results. The particular advantages claimed for the electric drill over the air drill are low first cost of plant and ease of installation, and great economy of power. Every one of these claims is true, but when the high cost of maintenance and time lost incident to breakdowns are considered, the above claims sink into insignificance, particularly when the continuous operation of the entire mine depends more upon the reliability of the rock-drilling apparatus than on any other factor. The main difficulty with the electric drill seems to be weak insulation, as no form that has yet been devised will stand up under the continued jar of the drill body for any appreciable length of time. With the motor removed from the drill body, insulation difficulties are overcome, but trouble is encountered with the connecting mechanism. The author has compiled a table showing the results of recent comparative tests between two electric drills equal to any put on the market, and two air drills operating at eighty pounds' pressure. The air drills were in actual use 317 hours, during which time they drilled 1,279 feet, or an average of four feet per hour, and were not stopped at any time for repairs. The electric drills were in operation 100 hours, drilling in that time 253 feet, an average of 2.55 feet per hour, and were laid up for repairs for seventeen hours. The work was done on black diabase during fifty-three consecutive ten-hour shifts.—*Abstracted from the Engineering and Mining Journal (New York), August 18.*

The Moutiers-Lyons (France) High-Tension, Direct-Current Transmission.

The most recent installation of the Thury direct-current system of transmission is that recently put into service from Moutiers, in Savoy, to the city of Lyons, France, a total distance of 110 miles. The maximum direct-current voltage is 60,000. The district lying to the east of Lyons contains many water-power stations, and the new power supply consists of an interesting combination of three-phase alternating current and high-tension continuous current. The generating station at Moutiers transmits energy eighty-five miles to the switch house at Sablonnières, which also forms the centre of a converging three-phase system of transmission lines bringing energy from Bellegarde (10,000 horse-power), Avignonet (8,000 horse-power), Lechylienne (8,000 horse-power), and La Bourne (5,000 horse-power). The whole system is under the control of the Société Grenobloise de Force et Lumière. All of these plants supply energy at 26,000 volts, fifty cycles, three-phase, with delta-connected transformers at the receiving end. From Sablonnières the total energy is transmitted twenty-five miles to Vaulx-en-Velin by two sets of three-phase lines and two direct-current lines, the total power required for Lyons being then transmitted two and one-half miles under ground to a receiving station, where it is partly transformed into direct current at 600 volts for the traction system by three-unit motor-generator sets, each consisting of two Thury motors direct-coupled through a flexible insulated coupling to a traction generator. At the Moutiers station there are four Thury groups, each driven by a separate water turbine. Each group consists of four armatures and four magnet frames in two pairs, each pair mounted on a common cast-iron base and separated from the other pair by an insulated friction coupling. The whole group is then coupled to the turbine through another similar coupling. All the generators are insulated from the floor. Each group is supplied with one ammeter, one voltmeter, a switch and a pair of horn lightning arresters. These are all mounted on a small controlling pillar standing beside the group. The object of the arrangement of generators employed is to overcome the objection that it would be impossible to increase the output of such a station without raising the pressure, if all the machines were operated in series. With the present arrangement it becomes possible to throw the two pairs of generators constituting a unit in parallel, thus doubling the current output of the station. Each group at the Moutiers station has a maximum pressure of approximately 15,000 volts, corresponding to 3,300 volts per commutator, and the line current is seventy-five amperes, making the total output of the station approximately 4,500 kilowatts. Provision is made for grounding the central point of the system and either line in case of a breakdown. At the earthing stations four ammeters are provided, which enable observations to be taken of the current passing either into or out of the station by the earth or by the wire. The earth connections at these stations consist simply of iron plates scattered over a small area and buried in wet earth. It is claimed that there is never more than a maximum drop of 200 volts between ground and line when carrying the full current of seventy-five amperes. The substation at Vaulx-en-Velin is more complicated than the others, because it forms the final receiving point for all power transmitted toward Lyons, and also acts as a reserve station, so that in case of a breakdown at Moutiers or on the transmission line three-phase station, the alternating-current machines at Vaulx-en-Velin may be driven as synchronous motors, operating the Thury motors as generators and supplying Lyons. In case additional alternating current is needed these units operate in the reverse sense. The voltage of the generators is regulated by a motor-driven solenoid-controlled regulator. The machinery at all of the stations is insulated by means of a floor consisting of an upper layer of pure asphalt, below which is a layer of asphalt and small stones and finally a concrete foundation. This floor, it is said, will withstand 80,000 volts alternating. The regulator at the Vaulx-en-Velin station performs a double function, as it acts not only as a voltage controller, but as a speed governor. It is said that there has been but little trouble on this system from lightning.—*Abstracted from the Electrical Review (London), August 10.*

Electrically Operated Slipway at Dublin.

A slipway for hauling vessels out of the water was in use in Dublin as far back as 1883, at which time it was constructed at a cost of $75,000. From that time until 1860 the hauling machinery was operated by hand. At the latter date steam haulage was introduced, without very materially quickening the work of taking a vessel from the water. With the revival of shipbuilding in the port of Dublin a few years ago, it became apparent that the antiquated slip machinery and carriage would have to be replaced by modern appliances. The change was provided for by the Dublin port and dock board in 1902, and a new carriage and winch operated by electricity have been installed. The machinery was designed to draw a vessel weighing 900 tons out of the water in thirty minutes. A flexible steel wire hawser is coiled on grooved drums, which are large enough to carry the whole length of the hawser without a second coil. Spur wheels are bolted to the drums and work by pinions which can be put in or out of gear by means of clutches, and thus enable a small drum which is installed for hauling the empty carriage back to the water to be operated independently of the large one. The small drum is driven through spur gearing by means of a friction clutch, and operates at the same speed of winding as the main winding drums. The motor drives the worm shaft through an enclosed single-reduction gearing. The worm is keyed to the pinion shaft. The motor selected is rated at 100 horse-power and runs at 750 revolutions per minute, drawing current at 300 volts. The gear ratio is 750 to 180. The motor is of the enclosed type, though usually operated with the sides of the cover open. It is provided with a number of resistances connected in the armature circuit, which are of sufficient capacity to reduce the speed to one-tenth the maximum when the motor is giving out one-tenth of its full-load torque, this for adjusting the carriage under the vessel. The machine is shunt-wound, and regulation at starting is effected entirely by the armature resistance. For light loads, when a higher speed may be employed, a regulating resistance is inserted in the field circuit, thus increasing the speed somewhat. The gradient of the slip is one in sixteen; the weight of the carriage approximately 100 tons. The usual size of vessels handled is not over 500 tons.—*Abstracted from Engineering (London), August 10.*

Society to Abate Smoke.

About forty city smoke inspectors held a convention in Detroit a few days ago for the purpose of forming a National Association of Smoke Inspectors. This it seems to us is an excellent idea, for the various members of this association by exchanging ideas and experience can enable any city that cares for such things to have the benefit of the best knowledge there is in the abatement of what is getting to be almost as serious a drawback to life in some of our American cities as it has been for generations in certain English cities. Little smoke need be made with bituminous coal.—*American Machinist.*

Methods of Getting New Business.

A department devoted to the commercial development of Central Stations. Managers are invited to contribute suggestions for methods of increasing the demand for electric service.

ORGANIZATION AND CONDUCT OF A NEW-BUSINESS DEPARTMENT SUITABLE FOR CENTRAL STATIONS IN CITIES OF 50,000 POPULATION AND UNDER.[1]

BY J. M. ROBB.

Success lies in never tiring of doing, in repeating and never ceasing to repeat; in toiling, in waiting, in bearing and observing, in watching and experimenting, in falling back on oneself by reflection, turning the thought over and over, round and about the mind and vision, acting again and again upon it—this is the law of growth. The secret is to do, to do it now; not to look away at all.

Bishop Spalding's definition of success fits the organization and conduct of a new-business department as though he had it especially in mind when he penned these lines. The ability to increase the sales of current must be as assiduously cultivated as you study the means of reducing costs and bettering your service, and there is no central station so small that it can afford to get along without a new-business department.

There is a general tendency to believe that others accomplish their work with less effort than ourselves, and this perhaps is responsible for the lack of confidence some central-station men have in their own ability to conduct a successful new-business department.

The busiest manager or superintendent, if he will persistently devote a few minutes daily to increasing his sales of current will accomplish results as amazing as they are gratifying when he reviews them. Do not let anything prevent your beginning your new-business campaign at once. Start now. Don't wait for printed forms or to think out definitely how you will go about it. When you have made your beginning you will be astonished at the opportunities for new business that will develop in the most unexpected places.

Working a new-business department is like popping corn. Your first efforts produce only a cracking sound, but no popped corn. If you stop now your work is lost; but keep on; first one kernel pops and then another and another. Encouraged by these, more and more kernels pop until your popper fills as if by magic.

If, most fortunately for you, your business seems to be in the condition of the full popper, remember the unpopped kernels that are always found when the popper is emptied.

There are plenty of unpopped kernels of undeveloped electrical business in your territory which a little attention would convert into profitable income.

Naturally your first thought will be "How much money shall I spend to secure more business?" As the limit up to which money can be profitably spent for this purpose is in all probability beyond your means, your chief concern will be to use to the best advantage the largest appropriation you can get. Go slowly at the beginning. As a general rule any expenditure for pushing your business will be beneficial, there are great possibilities for waste. Hence the necessity for waiting, observing, watching and experimenting.

How shall you spend your new-business appropriation? For solicitors? for newspaper advertising? or for "direct-by-mail" advertising?

The most efficient results will be obtained by a combination of all these methods; newspaper advertising to awaken your public to the possibilities of electric service, make your customers realize your appreciation that your business is governed to the largest possible extent by the same principles applying to any retail selling business, and to prepare the way for your solicitors.

Solicitors to call upon your possible customers, answer their questions, argue away their objections and clinch their orders, as well as to investigate the troubles of your present customers; explain your methods of handling their business, and convince them that they are actually receiving full value for the money they are paying you.

And, finally, direct-by-mail advertising, to excite the interest of these possible users of your service your solicitor can not readily reach; to back up his argument with those he does see, and to keep alive his prospective customers' interest between his calls.

Each of the above divisions of business-getting, properly handled, will produce excellent results, but the most effective work can only be done with a combination of all three.

Endeavor to handle your new-business appropriation so that your efforts will be continuous. If you must choose one of the three methods above outlined, by all means employ a solicitor and make strenuous efforts to keep him permanently at the work.

SOLICITORS.

In picking your solicitors, pay the most attention to their ability to handle people. For this work you must have salesmen, and no man who can not handle people can ever be a salesman.

The gift of "gab" is not an essential, but the ability to talk convincingly is. Many a loquacious salesman spoils his work by talking too much. Beware of the brilliant, sharp man who works by fits and starts.

Dependability is of the utmost importance. The slow plodder who never forgets a point once mastered will soon distance the speedy man who quickly catches on but just as quickly tires if his first efforts are not successful.

Persistency counts for more than dash. Few prospects are interested at the first call, and just as water constantly dropping wears away stone, so patient solicitation secures profitable business.

If you have, among your employés, a man who evidences selling ability, use him for a solicitor.

Your solicitor must, of course, thoroughly understand your business, but this does not mean that he must start with a working knowledge. If your man is a real salesman, he may be ignorant of the electric business at the start. A few days' coaching will fit him to begin your work, and every day after that will add to his knowledge. Some gas companies have made solicitors of their regular employés in connection with their routine work by paying them commissions on new business secured, with the understanding that the new-business work should be pushed only outside of regular working hours.

Properly handled, this practice will produce results, and it possesses the additional advantages of arousing the men's interest in pushing your business.

There is always danger, however, that

[1] Winner of the third prize offered by the Cooperative Electric Development Association.

the prospect of a commission will lead to neglect of some regular duty, and the practice is further likely to foment jealousy among the men.

An excellent way to pick solicitors is to advertise for salesmen and carefully study the applicants. You can soon pick out the effective men. The man who can't be earnest in advancing his own interests certainly won't make much headway in pushing yours.

In searching for soliciting material, do not neglect to consider how a woman can push your interests, if you can find one of the right sort.

Having picked your solicitors, take time enough to thoroughly explain your business policy to them. Discuss with them your rates, your contracts, your customs, and your rules and regulations. Make clear to them the distinction between profitable and unprofitable business. Teach them to think in dollars and cents and give them enough data to enable them to estimate the cost of connecting any business they secure.

Take them over your plant and endeavor to make them appreciate the amount of work involved in rendering good service to your customers.

If possible, make a few calls with each solicitor, letting him do all the talking, and then coach him between calls. If you already have one or more solicitors, they can assist you in training the new men, but it will be to your best interest to let the beginners receive their first notions of your methods of handling your customers from yourself.

Divide your territory into as many districts as you have solicitors, arranging as nearly as possible an equal division of business and residence territory in each district, so as to give each man an equal amount of possible business.

The size of your new-business appropriation will determine the number of solicitors you can use. Some companies have profitably worked one solicitor to each 4,000 of population. Each central station must determine the number of solicitors to employ from his own conditions.

Your solicitors are now ready to go after business, but your work in handling them has just begun. It depends on you to arouse their enthusiasm to the highest pitch and keep it there.

Have the solicitors report to you each morning as early as convenient and canvass their previous day's work. Have a little booster meeting to start the day. Have each man tell of the orders he secured yesterday, the prospects he developed, and anything which helped him secure an order.

Encourage the men to discuss the business freely and to advance their criticisms and suggestions. Be liberal in your commendations of good work, and sparing of criticism, but criticize sharply when circumstances require it.

As often as possible, explain the operation of some appliance you are pushing. Demonstrate its good points and teach the men the arguments to down any objection that could be advanced by a prospective customer.

Use every means at your disposal to increase the men's knowledge of your business, constantly impressing upon them that any increase in their efficiency is to your mutual advantage. Note carefully any articles in trade papers, etc., or any articles on salesmanship that will help your men and specifically call their attention to them, asking the men to read them carefully and then tell you what they think of the matters discussed.

Solicitors Daily Report

1 Name For Date

Customer's Name & Address	Contract No.	Lighting No. 16's	Lighting No. Arcs	Power H. P.	Signs 16"-	Appliances	Total Cost to Cust.	Est. Yrly. Load	Contract Rec.	Cash Rec'd
						Total Cash Rec'd by				
Total for this day.										
Total week up to this day.										
Total No. to 1st. day of week										
Total year to 1st. day of month.										
Total year to date Inc. Electric Company										

FORM FOR SOLICITOR'S DAILY REPORT.

Have your men 'phone to you at noon, both to let them know that you are following their work and to advise them of any prospects which may have developed in their respective territory since morning.

Keep a blackboard record of each man's work brought up to date, to advertise to all the employés the work the solicitors are securing. Have each solicitor turn in a daily report each morning, similar to form No. 1, given herewith.

If any payments are collected, the amounts must be properly entered, footed and receipted by your cashier, or whoever is authorized to receive the cash.

The daily, weekly, monthly and yearly totals make possible an immediate comparison of each man's work, both with reference to current results and to results obtained in any previous period.

This form should be printed on sheets in letter-head size and put up in pads. The completed sheets should then be filed in a vertical file, where they give a complete record of each man's work.

You must train your solicitors to be old-business retainers as well as new-business getters. They must realize that their own, the customer's and the company's interests are all bound together.

Turn over to them for investigation the complaints of customers in their territory. Have them look up the customer's apparatus, re-read his meter, explain to him the methods used in handling his business and make a vigorous effort to convince the customer that he has the same check on his purchases of current that he has on his purchases of any other commodity.

Energy expended to convince customers that they are receiving full value for the money they pay you, is one of the most profitable means of securing more business. If your customers are made to realize that they are receiving their money's worth in service rendered, they will use your service much more liberally and be much more open to your suggestions for their use of more conveniences requiring additional current.

It is a mistake to pay solicitors solely commissions on the sales of appliances. This practice will surely result in sales of appliances to customers who can not advantageously use them, and will certainly cause much dissatisfaction and loss to you.

A flat salary is preferable, and some managers adopt the flat-salary method because of the labor required to record the results of each solicitor's work.

The ideal method is a combination of a flat salary and a commission based upon the volume and value to the company of the sales of current effected by the solicitor, with a fine for business lost in the territory allotted to him.

One prominent gas company pays its solicitors a salary of $50 per month and a commission based on results secured, which is determined as follows:

A pool is made each month, representing a certain sum for each solicitor employed. The various kinds of business to be secured are classified and given an arbitrary value of a certain number of points. The greatest number of points is assigned to business requiring no additional investment to serve, and to busi-

ness corresponding to sign and power business.

From this the business is graded down to the lowest number of points for business which is simply renewal business, due to consumers removing from one location to another, and business requiring a heavy investment for a relatively small income.

To assist in the classification, the solicitor must report on a card the estimated cost of connecting the customer as determined from a schedule furnished him in which are given the costs, as determined by the previous years' averages, of the various items entering into the total investment necessary to serve the new business. He must also report an estimate of the first year's revenue from the new customer.

The ratio between cost of connecting and volume of sales is considered by the new-business department manager in assigning the number of points to the business secured.

At regular intervals the solicitor's records are checked from the customer's ledgers, so that the tendency to over-estimate the value of secured business may be offset.

A deduction of an arbitrary number of points is made for business lost in each solicitor's territory.

At the end of each month, each solicitor's points are totaled, and the percentage his total bears to the total of all the solicitors' points determines his share of the pool.

In this particular case the sum pooled for each solicitor is $25, making the average salary $75 per month per man. Some of the solicitors on this basis earn as much as $125 per month.

A better way is to determine what price you can pay for each kilowatt of new business secured, grading this price from a high rate for profitable business to a very low rate for business requiring a heavy investment, and no rate for unprofitable business.

Then agree to pay the solicitors a commission at these rates for a year for all business secured, having it understood that any business lost in their territory shall be deducted from the commission at the same rates.

Such an arrangement is mutually profitable for both solicitor and company.

The business secured can be readily determined if the backs of the possible-business index sheets be printed as shown on sheet "A."

The solicitor should be required to turn in with each order the corresponding possible-business index sheet on which he has noted what his order covers.

If the order represents a customer already connected, the amount of the customer's business for the year previous to securing the order should be entered on the possible-business index sheet and also the monthly average for the year. The sheet should then be filed in a secured-business binder under the name of the solicitor securing the business.

Each month for the year following the date of the order, the amount of the customer's business should be posted to the sheets and the increased business credited to the solicitor at the agreed rate. Such an arrangement may be kept up with a minimum of work and may be modified to suit any set of conditions.

It would induce the solicitors to devote their efforts along channels most profitable to the company, and the deduction for business lost would insure their being old-business retainers as well as new-business getters.

A — Report of Secured Business

No. ____ St. Name ____ Solicitor ____

Date ____ Order Secured for ____

Est. Cost to Connect ____ Est. Yearly Revenue ____

Revenue for Year previous to Order ____ K. W. Hrs. ____ Amt. ____

Revenue since order ____ Remarks ____

	K.W.Hrs.	Amount	
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total Year			
Previous Year			
Increase			

Meter removed ____ Cause ____

Electric Company

FORM FOR BACK OF INDEX SHEETS.

Under such an arrangement the solicitor would have every inducement to make every effort to remedy complaints, and he would find it very unprofitable to waste his time selling appliances to customers who could not use them to their best advantage.

If the foregoing seems too complicated a method of handling solicitors, you would do well to reflect that the success of your new-business department demands good men to carry on the work. You can secure the best work from good men only when you pay them in proportion to the results they secure for you.

Any plan which will increase the efficiency of your men in securing more business for you is mutually profitable to every one concerned.

POSSIBLE-BUSINESS INDEX.

One of the most necessary essentials of a systematic campaign for new business is a possible-business index.

Pope says:

Index learning turns no student pale,
But it grasps the eel of science by the tail.

That expresses the aim of a possible-business index. It is to the conduct of a new-business department what plans and specifications are to a piece of construction work. No two men will work up their new-business data precisely alike. Where one will want a complete plan, setting forth every detail, another will be content with a free-hand pencil sketch with a few notes.

It is well to bear in mind that when a man goes hunting he must have a pretty definite idea of what he seeks. If you have in your new-business campaign a complete index of the possibilities in your territory, you will waste less of your new-business appropriation.

While cards are generally used for such an index, loose sheets five inches by eight inches in size and bound in binders will be found to be far more useful, and, in addition, will give all of the advantages of a card index.

Some of the advantages over cards are as follows:

The sheets are larger, giving more space for useful data.

The sheets bound in the binders will always be found in their proper sequence, and, if necessary, can be removed from a binder as easily as a card from a file.

By using thin paper much more information can be filed in a given space.

By using a thin binder it may be carried in the pocket, and in this manner the sheets are much easier to handle in the field than cards.

Forms 2 and 3 and "A" give a set of forms for a possible-business index. Form "A" is to be printed on the reverse sides of 2 and 3. These forms are self-explanatory. The 'phone number is put in because often very affective soliciting can be done by 'phone. The data file number is to be used when correspondence or estimates, etc., accumulate in soliciting a prospect.

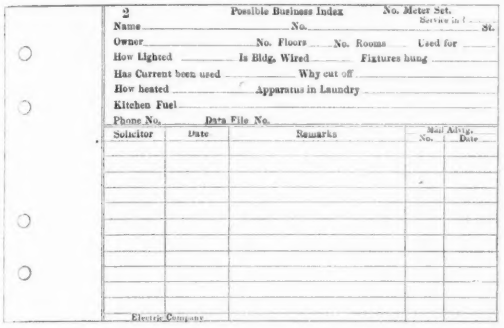
An envelope, large enough to contain all of the letters, estimates, etc., in flat sheets, is used, given a number and filed in your data files. The envelope number posted to the index sheet gives quick reference to all of the data on file for the prospect.

Your possible-business index should contain a sheet for each house or prospect in your territory. As your territory is extended put in a sheet for each house or prospect in the new territory.

Arrange your orders so that every meter set, remove or transfer order and every appliance order will go to the person in charge of the possible-business index, so that it will be always up to date and show a complete list of all electrical appliances you are supplying with current.

Remember that your index is your guide for directing your fight for more business, and the more careful attention it receives the less effort you will waste.

Use different colors of paper to indicate the different classes of new business.


2 Possible Business Index No. Meter Set.
Name No. St.
Owner No. Floors No. Rooms Used for
How Lighted Is Bldg. Wired Fixtures hung
Has Current been used Why cut off
How heated Apparatus in Laundry
Kitchen Fuel
Phone No. Data File No.
Solicitor | Date | Remarks | Mail Advtg. No. | Mail Advtg. Date
Electric Company

FORM FOR POSSIBLE BUSINESS INDEX.

For instance, white paper to indicate a building where no current has ever been sold.

Yellow paper to indicate a building now being supplied with current. Make the sheet for this class of business show an itemized statement of the connected load.

Red paper for a building where current has been supplied, but for some reason has been disconnected.

Brown paper to indicate power prospects.

Green paper to indicate sign prospects.

Properly laid out and handled, the possible-business index will not only show the possibilities for business, but it will also show the amount of work done on each prospect, and when the business is finally secured the index sheets can be used to keep a record of the business obtained by each solicitor. This is easily accomplished by noting on the sheets the orders to be credited to the solicitors and then filing them in separate binder behind the name of the solicitor who is entitled to credit.

Then, periodically, the revenue from such business can be posted to the sheets credited to each solicitor, and his income-earning value is thus readily determined.

One of the best methods of starting your solicitors is to have them first go over their territory to make up reports for the possible-business index. In this manner the ice is more easily broken for a new man and he quickly becomes familiar with his territory.

Periodically, at regular intervals, depending upon your local conditions, have your man check up the new-business index and carefully make the necessary corrections.

If you are mailing matter to your prospects, this practice will not only save money in postage, but the moral effect upon your prospects will increase the efficiency of your new-business department many per cent.

To assist in keeping your possible-business index up to date, give your solicitors credit for any business closed in your office, where the index shows the solicitor has called on the customer within thirty days of the date of the order.

NEWSPAPER ADVERTISING.

Your new-business department can be made to prosper without the aid of your newspapers, but, if you are wise and your appropriation permits, you will use them liberally and continuously.

Properly used, the newspaper will aid you in molding a favorable public opinion, and it will also secure new business for you. If it does nothing else, it will pay its cost in the increased efficiency it will produce in your solicitor's work. The newspaper adds a dignity to the house-to-house work of your men, which it would otherwise lack.

Use as much space as your appropriation will buy, but us it continuously. Don't splurge unless your appropriation will stand it. Consider, also, how the average person scans his newspaper, and you will realize that if you would have your advertisements noticed they must be arranged so that "he who runs may read."

This means that your newspaper talks must be very, very short, sharp, pithy, incisive. They must stand out so that upon the paper being opened the advertisement at once catches the eye. Plenty of white space must be used to accomplish this.

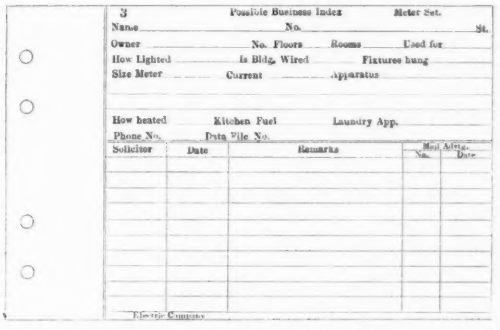
The following excellent suggestion is taken from the *Electrical World and Engineer* of March 25, 1905:

"In preparing copy for newspaper advertisements the central station man must bear in mind that his efforts will not be searched for, except by himself. Neither can he, as a rule, use sufficient space so that his advertisements will demand attention merely on account of their size. His problem, therefore, is to devise a means of insuring that his announcements will be read without resorting to anything bizarre or in bad taste.

"The plan here suggested has proved very successful, and any one who adopts it will find that his advertisements will be the most prominent thing on the pages which they adorn.

"It consists essentially of the purchase of a few fonts of a large, legible type to be used for your own announcements exclusively and differing from anything in regular use by the paper in which they appear. The type in which the advertisement here reproduced (but reduced to about sixteen points) is set is known as twenty-eight-point Caslon Old-Style and has the reputation of being the most legible face ever cut. It can be used to advantage in two ways—first, as in the example given, in a few lines well spaced and surrounded by plenty of white space; and second, in two or three lines well spaced, as before, and followed by matter in small type. While Caslon Old-Style is probably the best type for this purpose, there are other plain, bold and legible faces which can be used if the Caslon is preempted, though, as a matter of course, the results will not be so good if others are already using the same idea. When there is no competition in the lighting business, it is just as well in this style of announcement to omit all reference to name and address. It is 'different,' and that in itself is good advertising. The following are offered as suggestions for 'copy.' Some of them are original, others have been culled from various sources:

"In papers of ordinary get-up as to their advertisements, it is surprising how impossible it is to look at a page containing one such as I have described without seeing it first, almost to the exclusion of everything else. Two fonts of type costing about $8 will set any of the advertisements which can be set in the space commonly used."


3 Possible Business Index Meter Set.
Name No. St.
Owner No. Floors Rooms Used for
How Lighted Is Bldg. Wired Fixtures hung
Size Meter Current Apparatus
How heated Kitchen Fuel Laundry App.
Phone No. Data File No.
Solicitor | Date | Remarks | Mail Advtg. No. | Mail Advtg. Date
Electric Company

FORM FOR POSSIBLE BUSINESS INDEX.

In connection with the above, note the Macbeth lamp-chimney advertisements running in the magazines.

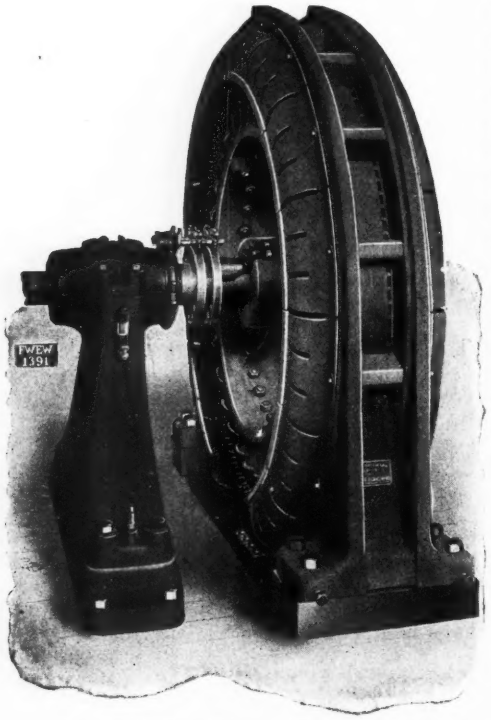
(To be concluded.)

INDUSTRIAL SECTION.

ILLUSTRATED DESCRIPTIONS OF NEW AND STANDARD ELECTRICAL AND MECHANICAL APPARATUS.

Polyphase Revolving-Field Engine-Type Generators.

The present practice in central-station and isolated plant engineering is away from the belt-driven type of generator, as the engine-driven type possesses some advantages. The large diameter of the rotating element enables the desirable high pheripheral speed to be obtained, while the weight of the moving part enables it often to take the place of the usual flywheel. Moreover, a direct-connected unit requires less floor space than a belted one and does away with the undesirable and expensive belt.



TYPE QRE FORT WAYNE TWO-PHASE, REVOLVING-FIELD, ENGINE-DRIVEN ALTERNATOR, WITH OUTBOARD BEARING.

To meet the demand for these machines the type of polyphase generator shown in the accompanying illustrations has been put out by the Fort Wayne Electric Works, Fort Wayne, Ind.

These alternators, when arranged for mounting the revolving field direct on the engine shaft, are designated as TRE type, when three-phase, and as QRE type when two-phase. When furnished with one or more bearings and a short shaft, and, if necessary, a base arranged for coupling to the source of power, they are designated, respectively, as type TRC and QRC.

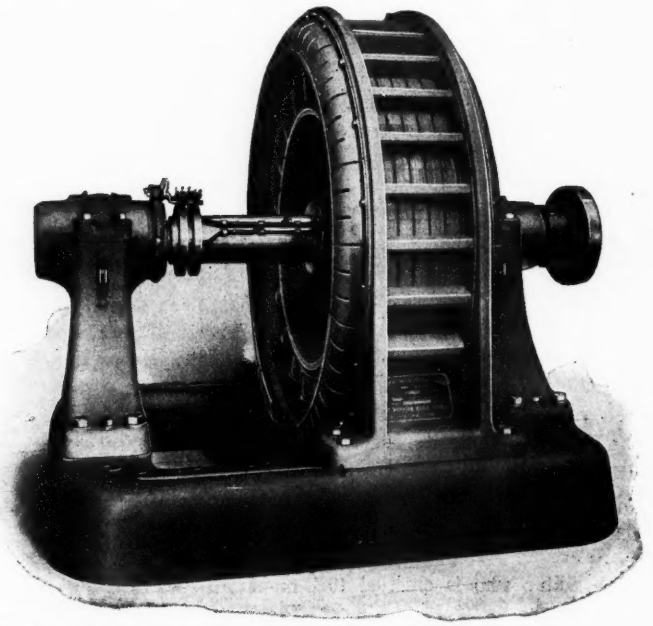
The revolving field of these alternators is made particularly rigid to withstand all mechanical strains. The cores consist of laminated iron stampings of high grade, clamped in place by means of through bolts which force them into a uniform rigid mass. These cores are mounted upon the rim of a cast-steel spider either by dove-tail construction or by means of through bolts, according to the centrifugal force which they must withstand during operation. Either construction permits the easy removal of any particular field core, if necessary. The field coils consist of edge-wound copper strips, each turn being insulated from its neighbor by means of paper templets placed between the layers, a construction which ensures efficient insulation and cooling, as the bare edges of the field conductors are directly exposed to the air. Current for the field coils is supplied from the exciter through two cast-iron slip rings mounted upon the shaft. Carbon brushes are used for making contact with the rings.

The main frame casting for these generators forms the support for the armature core, and the whole is designed so that it may be moved in a direction parallel to the shaft, in order to gain access to either the armature or field coils. Within this frame the armature core, built up of high-grade iron punchings clamped into a rigid mass, is supported by means of dove-tails into the frame. This construction reduces eddy currents and ensures a constant air-gap at all points; and also provides amply for ventilation.

The armature coils are form-wound, insulated and tested before being assembled in the core. This construction enables a damaged coil to be replaced easily. Great care is taken to provide insulation which will not deteriorate under all ordinary conditions of operation.

Two types of exciter are provided for these machines. That usually supplied is belt-driven from a small pulley placed on the slip ring end of the shaft, but, when desired, a direct-connected exciter will be supplied.

One feature of these alternators is the combined alternator-exciter field rheostat which is provided. This rheostat does double duty, as both the alternator and the exciter field currents are passed through it. Two contact arms are provided, one for each field circuit; but an adjustment of either one, since it affects a current flowing through a resistance which also carries the other current, will cause a corresponding adjustment in both circuits—that is to say, increasing the resistance in order to cut down the field current also lowers the voltage of the exciter.



TYPE TRC FORT WAYNE THREE-PHASE, 2,300-VOLT, ENGINE-DRIVEN ALTERNATOR.

A Voltage Regulator for Both Alternating and Direct-Current Systems.

A simple and reliable automatic voltage regulator for both direct and alternating currents is shown in the accompanying illustration. This regulator is the latest product of W. H. Chapman, and embodies the results of a long experience in solving problems of regulation in central station

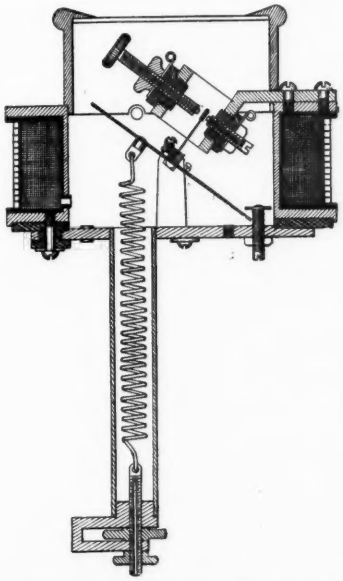


FIG. 1.—SECTION OF RELAY, "W. H. C." VOLTAGE REGULATOR.

and isolated plants. The regulator is manufactured by the Portland Company, of Portland, Me.

There are four methods in which this regulator may be applied. It may be used first either for alternating or direct-current generators, for regulating the voltage output and maintaining it constant at the bus-bars or at a distant end of the line. Secondly, the regulator may be applied for controlling the voltage delivered by a storage battery, maintaining it constant on a circuit for lamps and motors. Or the regulator may be used in the reverse manner for controlling the storage-battery charging current, keeping it constant. Finally, the regulator is suitable for controlling the voltage of individual lamp circuits or motors which are fed from a variable source of supply.

This regulator is composed of three essential parts—a relay for detecting small changes of voltage or of current and applying the corrective force; a rheostat, and a pair of working solenoids for operating the rheostat switch in response to the movements of the relay.

Fig. 1 shows a section of the relay. It consists of a coil wound upon a brass spool. Within the coil is a thin iron disc pivoted at opposite ends of a diameter. Due to the magnetic force set up by current passing through the coil, this disc tends to turn so that its plane will be along the axis of the coil, but is opposed in its motion by the spring shown. This spring is under tension, and is controlled by means of the thumb-screw and lock-nut shown at the bottom. This device enables a close adjustment of the voltage to be made, as to produce a change of one volt requires that the thumb-screw be given merely a turn.

Attached to this rotating disc is a spring having platinum contacts at the end. This, due to the motion of the disc one way or the other, makes contact at one or the other of two adjustable fixed contact points, which close the circuit through the controlling solenoids. These points are also tipped with platinum, and are protected from dust by means of a metal cover with a glass top. Two resistance lamps are placed in series with the relay coil for cutting down the current and for compensating for temperature changes. The temperature coefficient of resistance of the lamps is positive, while that of the coil is negative. In this

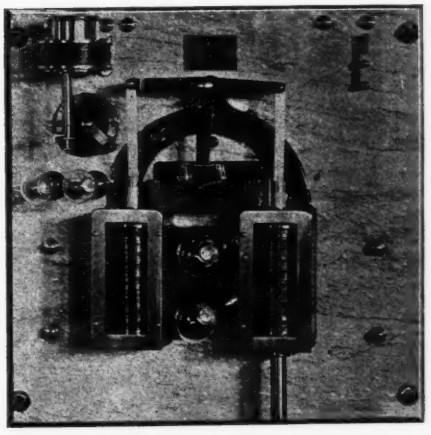


FIG. 2.—SWITCHBOARD TYPE OF "W. H. C." VOLTAGE REGULATOR.

way errors due to changes in temperature are avoided.

Fig. 2 shows the switchboard type of regulator. The relay is seen in the upper left-hand corner, while in the centre are the two solenoids. These solenoids are carrying current only when the circuit is completed by means of the coil, so that they are in operation only a small part of the time. They have two windings—a primary, which carries the operating current; and a secondary, wound in the same direction. The latter is short-circuited upon itself, and its function is to prevent arcing at the relay contacts, this being done by the reaction of the secondary current induced when the circuit is broken. There is, in addition, a pair of high-resistance lamps connected up so as to absorb any little discharge remaining after this action.

The rheostat by means of which the circuit is controlled is made in two types. For small currents the resistance is built up of a set of enameled resistance units, while for larger sizes the resistance units are cast-iron grids. One of these grids may be seen in the bottom of Fig. 3. This figure also shows a rear view of a 150-kilowatt regulator, illustrating the manner in which the grids are held in position and connected to the dial plate on the panel-board.

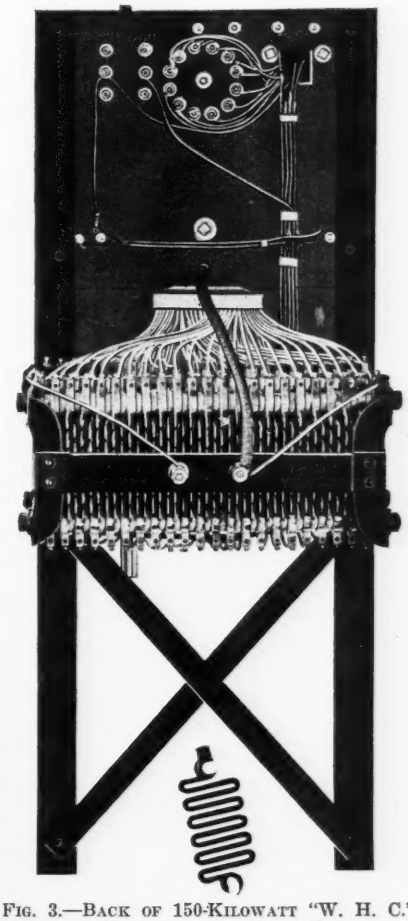


FIG. 3.—BACK OF 150-KILOWATT "W. H. C." VOLTAGE REGULATOR, SHOWING RESISTANCE GRIDS CONNECTING TO THE COPPER SEGMENTS, PROJECTING THROUGH THE SLATE PANELS.

To prevent oscillatory motion or drifting of the regulator, a dashpot is attached to one of the solenoid cores. This is a simple device, and by means of an ingenious arrangement the dashpot ports are opened or closed by a slight turn of the cylinder.

For use on large systems the regulator is supplied with a shunt block, from which

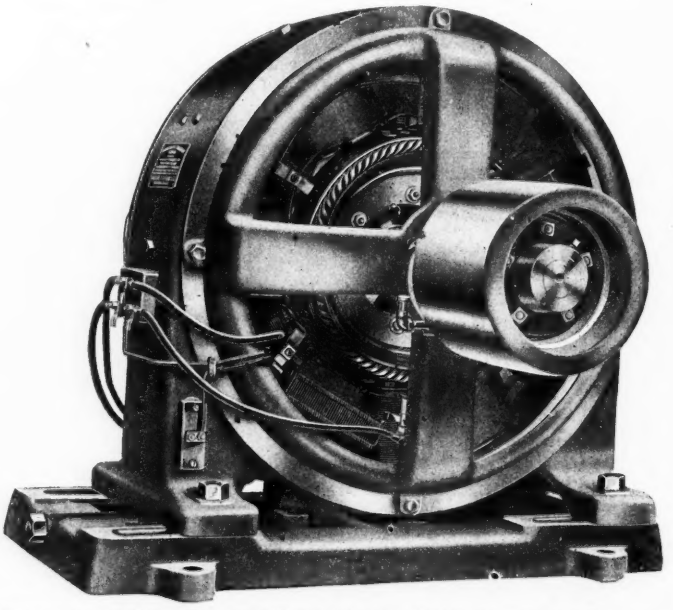
the small current required by the relay is obtained. For alternating systems, a series transformer takes the place of the shunt.

In Fig. 2 may be seen the method of making contact with the resistance units is clearly shown. The resistance units are connected to a set of copper segments arranged in the arc of a circle on the face of the regulator, and a lever arm carrying the contact shoes, pivoted at the centre of the circle, moves over them. The shoes are held firmly to the surface, yet cause but a small amount of friction. A current of one-half an ampere is sufficient to operate a 500-kilowatt regulator. For commercial purposes the regulator is designed to control within one per cent, this being all that is required, although, if necessary, a regulation of one-quarter per cent can be secured, though at some additional expense.

Commutating-Pole Variable-Speed Motors.

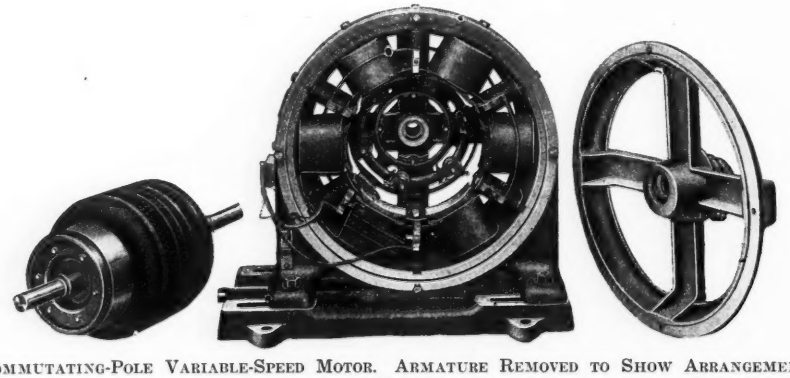
The exacting requirements of machine-tool motor drives, hoist work and other classes of severe service have created a demand for a variable-speed electric motor. In order to meet these conditions and also to increase the output from a given motor frame, the General Electric Company is placing on the market a line of variable-speed commutating-pole motors, known as the CLC type for large power, while the smaller sizes are designated as type CQC.

As can be seen from the illustrations, the commutating poles in these new machines are placed between the main field poles and are so wound that they are excited by a portion of the main current. The main field is usually provided with an ordinary shunt winding, but may be also compound wound when service conditions require. The commutating poles provide a magnetic field of sufficient intensity to neutralize the effect of the current in the armature coils which are short-circuited during commutation. Sparkless commutation at all loads within the speed range specified is thus obtained. As the action of these poles is reversible the motors can be run equally well in either direction.



COMMUTATING-POLE VARIABLE-SPEED MOTOR. SHOWING GENERAL DESIGN.

Not only does the addition of commutating poles improve the operating conditions of the motors, but the new machines can be operated at a higher output over a wider speed range, so that greater power is concentrated in a small-size frame.



COMMUTATING-POLE VARIABLE-SPEED MOTOR. ARMATURE REMOVED TO SHOW ARRANGEMENT OF POLES.

The mechanical details of construction of the new line of motors is similar to that of the well-known CL and CQ motors made by the same company. In the CLC motor the field frames are of cast iron, while in the smaller size CQC type they are built of steel. Both types of motors are so constructed that, by turning the bearing brackets through 90 degrees or 180 degrees relatively to the frame, the machines can be mounted on wall or ceiling. When motors are used in places where flying particles or dirt are liable to injure the machine, the bearing brackets are fitted with perforated hand-hole covers, which furnish complete protection to the motor and, at the same time, allow free circulation of air through the windings. Solid hand-hole covers can be supplied when it is necessary to enclose totally the motor; the capacity of the motors under such circumstances, however, will be somewhat reduced, owing to the increase in ventilation.

The CQC motor combining as it does the compactness and general efficiency of the CQ type of motor, together with the advantages accruing from the use of the commutating pole, is particularly suitable for individual variable-speed machine-tool drive. It is small in diameter, comparatively short along the shaft, and substantial in construction. All these qualities make it an ideal motor for driving lathes, as it can be mounted on the top, bottom or side of the driven machine. Similarly, the commutating-pole type CLC motor is suitable for the larger classes of machine-tool work as well as for ordinary commercial requirements. Type CQC motors range in size from five to twenty horse-power. For heavier work the CLC motor is built in capacities up to and including 130 horse-power.

A Rythmic Regulating Socket Plug for Fan Motors.

The accompanying illustration shows the outward appearance of a rythmic fan regulating socket plug which the Phelps

RYTHMIC REGULATOR PLUG FOR FAN MOTORS.

Company, Detroit, Mich., has recently placed on the market. This plug contains within the extended fibre tube a thermostat, which throws the fan motor on and off, keeping the air in a disturbed condition, and, at the same time, cutting down the consumption of current. The regulator is interpolated between the electric fixture and the fan plug.

The "Peerless" Switch.

A new five-ampere switch has been put upon the market by the Marshall Electric Manufacturing Company, of Boston, Mass. This is designated as the "Peerless" and has been got out to meet the

"PEERLESS" FIVE-AMPERE SWITCH, WITH COVER.

demand for such a switch. The accompanying illustrations show the inside and outside appearance of the switch. From them it is seen that there are but few parts; that the mechanism of the switch is quick-acting, strong and serviceable. Tests have been made which have proved that thousands of turns of the switch might be made, as required by the underwriters, without any injury to the mechanism.

One feature of the switch which is worthy of notice is the lining of the cover.

"PEERLESS" FIVE-AMPERE SWITCH, COVER REMOVED.

This is drawn in one solid piece without seams or crimping.

These switches are carried in stock at the New York office of the company, 227 Fulton street, and at the Chicago office, 169 Adams street, as well as at the office in Boston.

A New Company to Manufacture Incandescent Lamps.

Financial interests comparatively new to the electrical industry are behind a new company — the Novelty Incandescent Lamp Company—which is being organized in St. Marys, Elk county, Pa., for the manufacture of incandescent lamps. The new company is being operated on an entirely independent basis, it is announced, and no understanding or agreement as to methods or prices will be entered into with any existing association of manufacturers in this field. It is believed that the character of the men committed to the company and the policies as to sales methods and prices which it is the purpose of the management to inaugurate will be sufficient to gain the interest of lamp buyers.

The product to be marketed will embrace the new "Elk Standard" incandescent lamps, "Novelty" miniature lamps, and "Novelty" renewed lamps.

For the manufacture of the new types of standard incandescent and miniature lamps the company is now erecting a new building at Emporium, Pa., twenty-one miles from St. Marys. For handling the department devoted to renewed lamps a two-story brick addition to the plant now occupied at St. Marys is in course of construction.

The officers of the company are: R. K. Mickey, president and general manager, St. Marys, Pa.; Josiah Howard, vice-president, Emporium, Pa.; Joseph Kaye, secretary, Emporium, Pa.; A. F. Vogt, treasurer, Emporium, Pa. These gentlemen, together with Henry Auchu, of Emporium, Pa., constitute the principal members of the board of directors.

It is announced that in the near future the two plants of the Novelty Incandescent Lamp Company will have developed facilities for the production of 10,000 lamps daily.

An Interesting Suggestion for the Electrical Contractor.

Ralph A. Schoenberg, proprietor of the Sarco Company, New York city, has introduced a novel suggestion concerning the placing of electrical specialties by the workmen in charge of the installation. This suggestion is embodied in a letter recently sent to a number of contractors throughout the country, an extract of which is given below:

At the National Contractors' convention, recently held at Cleveland, I chanced to meet a contractor who has two stores in London and a branch office in Paris.

I happened to show him the new pendant switch manufactured by us, and he informed me that in London, when an article of this kind is brought out on the market, the contractor gives each of his wiremen a sample to carry in his pocket, and when he goes out on a job, either to a private house, store or office, where they have electroliers, cluster lights, banquet lamps, brackets or chandeliers out of reach, the wireman is instructed to show the owner how easily the light can be controlled by a switch in circuit.

The average customer would be more interested in a suggestion from the wireman, who is a disinterested party, than from the boss, who is out to make his profit, the result being the wireman in some instances has sold as high as twelve or fifteen pendant switches at a price ranging from $1.50 to $2 apiece, and the wireman gets the commission for the extra work received, which at the same time induces the wireman to keep his eyes open for other extra work.

I have mentioned the above method to several prominent members of the Contractors' Association here in New York and they have secured such very good results that I have decided to mention the matter to you, and should you try it and meet with success, I would appreciate a line from you in regard to same.

New System of Railway Signaling.

A new system of railway signaling is being experimented with by the Great Western Railway, of England. This is briefly described by United States Consul Frank W. Mahin in a recent report. A noteworthy feature of the new system is that the signal is given audibly, and not visually. The engine, as it travels along the track, comes into contact with an apparatus fixed to the track, which is controlled from the signal tower. This apparatus sets in motion the signaling mechanism on the engine. Signals are given by means of a whistle and a bell, both of which are fixed in the cab beside the engineer. The new system is thought to be of particular value for foggy weather, and is therefore suitable for parts of England.

CURRENT ELECTRICAL NEWS

DOMESTIC AND EXPORT.

NORTHWESTERN TELEPHONE STOCK INCREASED—The Northwestern Telephone Company, Minneapolis,, Minn., will issue $5,000,000 new stock, increasing its capital from $10,000,000 to $15,000,000, to provide for the extension of lines through Minnesota and the Dakotas.

TELEPHONE LINE ACROSS PENNSYLVANIA—A charter has been granted to the Philadelphia, Pittsburg & Erie Telephone Company, of Harrisburg, Pa., to operate a telephone line across Pennsylvania. This is understood to be a combination of the independent telephone companies.

SOUTHERN PACIFIC TO ELECTRIFY PART OF ITS SYSTEM—The Southern Pacific Company has undertaken the work of transforming its entire Alameda (Cal.) system of local trains to an electric system, and will extend the system into Oakland over new lines. Engineers of the company have about completed detailed plans for the change.

ST. LOUIS TO VOTE ON INSTALLING A MUNICIPAL ELECTRIC LIGHT PLANT—An ordinance will be sent to the municipal assembly of St. Louis, Mo., when it reconvenes September 7, providing for the submission to the voters of a proposition to install a municipal electric light plant. It is estimated that the cost of such a plant would be $1,000,000.

MEXICAN LIGHT AND POWER COMPANY—An interim report of the Mexican Light and Power Company has been issued for the first half of the present fiscal year. It shows gross earnings for that period of $1,754,833, in Mexican currency, with operating expenses of $722,330, which represents about forty-one per cent of the gross receipts. There has been a steady increase in the monthly earnings since the commencement of 1906.

NEW UNDERGROUND TELEPHONE SYSTEM—An underground telephone line is being constructed between Chicago, Ill., and Milwaukee, Wis. It is estimated that this will be ninety miles in length and will carry 18,000 miles of wire. The Pupin system of loading coils is being installed. The construction work will be carried by the Chicago Telephone Company to a point near the Wisconsin line and by the Wisconsin Telephone Company from there to Milwaukee.

PUEBLA (MEXICO) ELECTRIC COMPANIES MERGE—It has been announced that the Puebla Light and Power Company, recently formed by Canadian capitalists, has taken over the lighting and power companies in the city of Puebla, in addition to the tramway lines. The latter were secured from the Wernher-Beit company, who also formerly owned the Mexican tramway lines, while the light and power companies were purchased from other English capitalists. The Puebla company will have a capital of $5,000,000 bonds, and $3,500,000 stock.

CONSOLIDATED TELEPHONE COMPANY BUYS GREAT EASTERN COMPANY'S FRANCHISE—It is announced that the Consolidated Telephone Company, of Buffalo, N. Y., has bought from the Great Eastern Telephone Company the latter's franchise to maintain and construct telephones, telegraph lines and electric lights in New York city. The amount paid is said to be $50,000,000. A syndicate is to be formed to take over the franchise, and an operating company will later be formed to install an independent telephone service in New York.

DAYTON COMPANY INCREASES CAPITAL STOCK—The Dayton Citizens' Electric Company has increased its capital stock from $100,000 to $1,500,000 and elected the following board of directors: Valentine Winters, Adam Schantz, S. W. Davies, E. J. Barney, George Sohngen, S. J. Patterson, of Dayton; Edward Sohngen, Edward Murphy, of Hamilton, and George B. Cox, of Cincinnati. Mr. Winters was elected president and treasurer; Adam Schantz, vice-president, and Cyrus E. Mead, secretary and general manager. The company will expend $1,000,000 during the present year and already has the work well under way.

WORK STARTED ON NEW POWER PLANT—The Spartanburg Electric Power Company will spend $1,000,000 in developing water powers in Spartanburg and Cherokee counties, South Carolina. The company is composed of Pittsburg and Spartanburg capitalists. R. C. Crawford, J. C. Slack and F. R. Dravo, of Pittsburg, are among those interested. The work of building an electric power-house on Broad river, near Gaffney, is now under way. As soon as this is completed the company will erect a power-house at Nesbitt shoals for supplying electricity to cities and towns in the adjacent territory.

LARGE BOND ISSUE SOLD—It is announced that the Chicago State Bank and the Trowbridge & Niver company, of Chicago, Ill., have bought the $3,000,000 bond issue of the La Crosse Water Power Company. The water-power company will build a water-power plant at Mormon riffles, on Black river, near Hatfield, Minn., and proposes to supply Winona, La Crosse, Black River Falls and other cities within the territory with power and light. The company will also build an electric railway line between La Crosse and Black River Falls, a project which has been under consideration for a number of years, and for the accomplishment of which several companies have been organized in the past.

PITTSBURG COMPANY BUYS MASSENA POWER PLANTS—The Pittsburg (Pa.) Reduction Company has obtained absolute control of the extensive electric power facilities at Massena, N. Y. The company bought the controlling stock of the St. Lawrence County Electric and Water Company, capitalized at $100,000; the St. Lawrence Water Company, capitalized at $100,000, and the Massena Electric Light and Power Company, capitalized at $50,000. The Pittsburg company recently purchased the St. Lawrence River Power Company, which owns the canal between the St. Lawrence and Grasse rivers, now developing 35,000 horse-power, with an ultimate capacity of 150,000 horse-power.

ELECTRIC WATER POWER IN HAWAII—The first electric water-power plant in Hawaii has been completed on the island of Kanai. The plant is operated by the Kanai Electric Company, and its entire equipment represents an investment of $300,000. The electrical machinery was furnished by the Westinghouse Electric and Manufacturing Company. The main purpose of the plant is to operate a number of pumping stations on a large sugar-cane tract, distributing water over the land situated at high levels. This work had been done with steam pumps. By the utilization of the electric current the capacity of the plant will be raised to 40,000,000 gallons a day, at a saving of $17,000 a month.

PORTLAND (ORE.) RAILWAY CHANGES HANDS—Important changes have been effected in the management of the United Railways Company, placing the entire control and nearly all the stock of that organization in the hands of C. E. Loss, of San Francisco, Cal. In addition to the steps already taken, Mr. Loss announces that the reorganization of the company will soon be completed, subsequent to which the construction of its projected lines in and tributary to Portland will immediately be commenced. W. L. Benham will retire as president of the company and will be succeeded by Mr. Loss. It is planned to spend $3,000,000 in constructing lines in Portland and vicinity. Of this amount $1,250,000 will be required to build and equip the system within the Portland boundaries. The lines within the city are to be constructed first.

MICHIGAN LAKE SUPERIOR POWER COMPANY—The United States Circuit Court of the Western District of Michigan has granted permission to Receivers C. D. Warren and Clarence M. Brown, of the Michigan Lake Superior Power Company, to issue $500,000 receivers' certificates. The receivers will dispose of these certificates immediately. They will probably be placed with Philadelphia and New York banking houses, although the bondholders may be given

the opportunity to subscribe to a portion of the issue. The proceeds will be used to complete the necessary improvements to the power plant, so that it can be brought to its maximum capacity. The Lake Superior corporation has guaranteed that the $500,000 will cover the cost of all necessary improvements. The Union Carbide Company, which now has a considerable contract with the power company, has also agreed to take as much additional power as can be allowed it when the improvements are completed.

PERUVIAN ELECTRIC CONSOLIDATION—Details are at hand of the recent consolidation of electric companies in Lima, Peru. The capital of the new corporation will amount to 15,000,000 soles ($500,000), to which the united companies have contributed in the following proportion: the Santa Rosa Electric Works, 6,150,000 soles, or, say, 615 soles for each of its 10,000 shares; the Lima Electric Tramway, 5,500,000 soles, or twenty-five soles for each of its 222,000 shares; the Lima & Callao Electric Railway, 2,100,000 soles, or twenty-one soles for each of its 100,000 shares, and the Lima & Chorrillos Electric Tramway, 1,200,000 soles, or fifteen soles for each of its 80,000 shares. To this capital must be added the various issues of bonds of the united companies, which amount in the aggregate to about 6,000,000 soles, the whole making 21,000,000 soles, which may be considered as the representative value of the concerns composing the so-called trust. The corporation's board of directors will be made up of twenty-two members, including two chairmen.

CINCINNATI LIGHTING DEAL—A lease for ninety-nine years of the Cincinnati Gas and Electric Company has been signed, giving it into the hands of the Union Gas and Electric Company. A. S. White, C. A. Leib, J. J. Rollins, of New York, and R. W. White, of Cleveland, represent the new company. The leasing company deposits $3,000,000 as a guarantee of dividends to the old stockholders. The capitalization is $20,000,000, half preferred at six per cent and half common. It is expected that Norman Kenan, president of the old company, will be elected to a similar position in the new corporation. It is said that the new company, which will succeed to a practical monopoly of the lighting business in Cincinnati, will spend large sums in the improvement of its property. The contract is said to contain a stipulation that $2,000,000 is to be expended in the next five years. The Union Gas and Electric Company has increased its capital from $10,000,000 to $20,000,000. It is understood that $10,000,000 six per cent preferred stock will be sold immediately.

PERSONAL MENTION.

MR. ERNEST RITTER, manager of the York (Pa.) office of the Pennsylvania Telephone Company, has been made manager of the Easton office. He is succeeded by Mr. G. H. Fulmer.

DR. GEORGE G. BAKER, an old-time electrical man who some years ago was prominently connected with telephone and telegraph interests, is visiting relatives in New York city. Dr. Baker is now permanently located at Denver, Col.

MR. JAMES ROSS has retired from the presidency and directorate of the Mexican Light and Power Company. His successor is Sir George A. Drummond, president of the Bank of Montreal. Mr. Charles H. Cahan, the company's solicitor, has been added to the directorate.

MR. GEORGE B. TRIPP, formerly general manager of the Colorado Springs Electric Company, has become associated with the organization of Messrs. Curtis & Hine, engineers and central station managers, with headquarters at Colorado Springs, Col. A number of large projects are under way, and Mr. Tripp expects to be very busy in the future on various undertakings that his company may supervise. Mr. Tripp had been connected with the gas and electric proposition at Colorado Springs for five years, and under his direction these properties have been very successful. He is one of the best-known men in the Western field, and for several years has been the efficient secretary-treasurer of the Colorado Electric Light, Power and Railway Association.

MR. MAX LOEWENTHAL, the well-known electrical heating engineer, having been commissioned by Mr. John Wanamaker to reorganize the electrical supply department, is now installing an elaborate display covering a floor space of 1,600 square feet in the basement of the New York city building. A model kitchen and bedroom are being erected, in which every conceivable electro-domestic appliance, from a push-button to a refrigerating plant, will be shown in actual operation. Electric cooking will be demonstrated at another portion of the exhibit, which will be opened to the public during the first week in September.

ELECTRICAL SECURITIES.

Every full business day during the last week in the stock market showed a record in excess of a million shares. Prices show not only general gains for the week, but, in some cases, the advances have been of very generous proportions, showing new high levels for the year. So far as the industrial and commercial situation is concerned, it can be said that there is no let-up in the widespread prosperity. There are already unmistakable signs of the usual fall trade expansion. This is reflected in bank clearings, railroad earnings and in reports of conditions in the leading trades, notably iron and steel and the cotton industry.

ELECTRICAL SECURITIES FOR THE WEEK ENDING AUGUST 25.

New York:	*Closing.*
Allis-Chalmers common	20
Allis-Chalmers preferred	48
Brooklyn Rapid Transit	77¼
Consolidated Gas	140
General Electric	168
Interborough-Metropolitan common	39¾
Interborough-Metropolitan preferred	80
Kings County Electric	160
Mackay Companies (Postal Telegraph and Cables) common	73⅜
Mackay Companies (Postal Telegraph and Cables) preferred	72½
Manhattan Elevated	147¼
Metropolitan Street Railway	106
New York & New Jersey Telephone	125
Western Union	91⅛
Westinghouse Manufacturing Company	150¼

Boston:	*Closing.*
American Telephone and Telegraph	132½
Edison Electric Illuminating	245
Massachusetts Electric	71½
New England Telephone	130
Western Telephone and Telegraph preferred	84

There has been a remarkable increase in the list of stockholders in the American Telephone and Telegraph Company, from 10,790 on January 1, 1903, to 17,556 on January 1, 1906.

The Edison Company, of Boston, during July showed an increased business of 22,000 sixteen-candle-power equivalents, against an increase for July, 1905, of 15,000 sixteen-candle-power equivalents. The company has closed a contract to supply the electric lighting and electric power for the new National Shawmut Bank building. The contract calls for about 4,000 lights.

Philadelphia:	*Closing.*
Electric Company of America	11
Electric Storage Battery common	71
Electric Storage Battery preferred	71
Philadelphia Electric	8⅝
Philadelphia Rapid Transit	29½
United Gas Improvement	87⅜

Chicago:	*Closing.*
Chicago Telephone	120
Chicago Edison Light	138
Metropolitan Elevated preferred	68
National Carbon common	85
National Carbon preferred	120
Union Traction common	4
Union Traction preferred	14

The Metropolitan West Side Elevated has issued its report for the year ended June 30. It is as follows: gross, $2,530,279; expenses, $1,208,287; net, $1,321,992; other income, $11,997; making a total income of $1,333,989; charges, $975,479, leaving a surplus of $358,510, equal to 4.11 per cent on the preferred stock. This surplus compares with $230,142 a year ago.

OBITUARY NOTICE.

MR. L. W. EATON, president of the Bryant Electric Company and the Perkins Electric Switch Manufacturing Company, of Bridgeport, Ct., died at his residence in that city on the morning of August 16.

TELEPHONE AND TELEGRAPH.

BROCKTON, MASS.—The mayor of Brockton has signed the franchise of the Home Automatic Telephone Company.

LAMONT, IOWA—The Buchanan County Telephone Company has sold the local telephone exchange to the Delaware County Telephone Company, the sale dating from August 1. The company will make many improvements to the system, and will shortly install a copper circuit.

VICTORIA, TEX.—The Southwestern Telephone and Telegraph Company will make extensive improvements to its system at Victoria and the section adjacent. Among the improvements will be the moving of the exchange nearer the wire centre, and the installing of a new switchboard and new telephones. The company's long-distance business has so increased that it is necessary that additional wires be strung between Victoria and Houston and points north and west.

COTTONWOOD FALLS, KAN.—E. P. Kellam has sold the telephone system of Cottonwood Falls and Strong City, with a number of rural lines, to the Missouri & Kansas company, of Kansas City. Prior to the sale Mr. Kellam had made arrangements for several new rural lines and will act as local agent for the new company until the proposed routes are completed. This is one of the best paying telephone systems in the state in proportion to its size. It is understood that the Council Grove system has also been sold to the Kansas City company.

RICHMOND, IND.—The trouble between the independent telephone companies in western Ohio and the Richmond Home Telephone Company, which threatened to cut off relations if the Ohio companies gave their patrons connection over the Bell long-distance lines, is to be amicably adjusted. The injunction suit brought by the Ohio companies, to prevent the Richmond company from cutting off service, has been called in the Wayne Circuit Court, and a continuance was granted till the September term of court, with the understanding that the differences will be patched up.

TOLEDO, OHIO—The Central Union Telephone Company has installed a despatching system for the Toledo Urban & Interurban Railway Company. There are now twenty-three sets of telephones in operation between Findlay and Toledo. The same company has also installed a despatching system for the Canton-Akron Railway Company between Canton and New Philadelphia. In addition to sixteen stationary sets in the offices of the traction company at various points there are twenty-five portable sets carried on the cars for the use of the motormen in receiving running orders.

SPOKANE, WASH.—Official announcement is made by Charles W. Reynolds, manager of the Spokane division of the Pacific States Telephone and Telegraph Company, that $500,000 will be expended on its system in the improvements now under way. New instruments are to be installed and the distributing frames will be replaced with apparatus of the newest design, the cost of the latter being $66,000. The company recently completed the installation of 1,500 telephone instruments, connecting the ranchers and farmers in the Spokane district with the central offices in that city.

WHEELING, W. VA.—At a meeting of directors of the National Telephone Company, held at Wheeling, a semi-annual dividend of three per cent was declared, and plans were announced for several important extensions and connections which will greatly improve the service of the company. It was decided to start work at once upon the new line to Mannington and Fairmont at an outlay of about $40,000. The right of way has been secured as far as Cameron. With the connections, which will be made at Fairmont, the extension will give National subscribers service to all important cities in northern part of West Virginia as far north as Steubenville. It was also decided, in connection with general plans for giving a first-class service to all parts of West Virginia, to proceed to close the gap of twelve miles between Wheeling and Marietta and Parkersburg. When this improvement is completed a large additional number of cities will be reached. The directors decided to close a contract with the United States Telephone Company for the construction of a line to Cambridge. This will furnish service to Columbus and Indianapolis and to all important points in Ohio, Kentucky and Michigan.

NEW INCORPORATIONS.

GUTHRIE, OKLA.—Weatherford Interurban and Light Company, Weatherford. $250,000.

JEFFERSON CITY, MO.—The Kelso Telephone Company, Illmo. Increase of capital stock from $5,000 to $10,000.

JACKSON, MICH.—Cambridge Telephone Company. $220. Directors: Millard E. Managan, Herbert R. Watkins and Chandler R. Knapp.

CAMDEN, N. J.—Electric Tramway Construction Company, Camden. $500,000. Incorporators: M. L. Berry, J. A. Riggins and W. B. Wolcott, of Camden.

NASHVILLE, TENN.—Hollow Rock Rixie Telephone Company, Carroll county. $1,000. Incorporators: J. W. Rowe, T. T. Park, M. G. Bowers, F. A. Broughton and T. A. French.

COLUMBUS, OHIO—The Navarre Electric Light Company. $10,000. Incorporators: George A. Myer, John W. Zinsmaster, David A. Fisher, Peter Zinsmaster and Charles Fetters.

AKRON, OHIO—The Canton-Akron Consolidated Railway Company, Akron. $10,000. Incorporators: Andrew Squire, C. E. Sander, W. M. Duncan, J. H. Dempsey and J. Wallrath Sutphen.

NEWARK, N. J.—Panama Street Railway Company, Newark. To construct railways, car lines, etc. $500,000. Incorporators: J. J. Spellman, of Orange; A. C. Walker and W. F. Delaney, of Newark.

ST. LOUIS, MO.—North St. Louis & Suburban Railway Company, St. Louis. For the purpose of constructing and operating a line of street railway in St. Louis and St. Louis county. $50,000. Stockholders: John Scott, John Scullin, Edward J. Scott, John B. Scott, Thomas Murphy, James Scullin and William Scullin.

KANSAS CITY, MO.—Electric Terminal Railway Company, Kansas City. Incorporated for the purpose of building a line of railway five miles in length, all within the limits of Kansas City. $300,000. Incorporators: John Mayer, of Parsons, Kan.; George H. Kahmann, W. E. Winner, Bayles Steele and H. G. Pert, all of Kansas City.

NEW PUBLICATIONS.

REPORT OF THE BOSTON (MASS.) WIRE DEPARTMENT—The annual report of the wire department of the city of Boston, Mass., for the year 1905, prepared by the commissioner of wires, Patrick J. Kennedy, has been issued. This describes in detail the work accomplished by the department.

THE STANDARD UNDERGROUND CABLE COMPANY'S HANDBOOK—The Standard Underground Cable Company, Pittsburg, Pa., has published a handbook of price lists, telegraph code and useful information relating to bare and insulated wires and cables for the conduction of electric currents, compiled by Joseph W. Marsh. While this handbook is primarily a price list of the insulated wires, electric cables and accessories manufactured by the company, there are included sufficient engineering data to remove it entirely from the classification of ordinary trade catalogues. There are a number of very interesting half-tone illustrations of wires and cables of different types, and a number of illustrations showing applications of various accessories. The sections entitled "Working Directions," "Testing" and "General and Electrical Information" will be found of particular value to engineers in general. The company is limiting the gratuitous distribution of the book to one to each of its customers and one copy to the executive officers of the larger corporations using such material as it manufactures. In order, however, that any one interested in the subject may be able to secure a copy, the company has decided to put the book on sale at a figure which is really nominal and which represents less than half the actual cost, *viz.:* grade A, bound in blue cloth, fifty cents; grade B, bound in plain leather, gilt edges, seventy-five cents; grade C, bound in limp leather with bill flaps and pockets, gilt edges, $1.

NEW MANUFACTURING COMPANY.

ALBANY, N. Y.—A certificate of incorporation of the New York Beck Lamp Company, of the village of Mineola, has been filed with the secretary of state. It is proposed to manufacture and sell electrical machines and appliances. The capital stock is placed at $50,000, consisting of shares of $100 each, and the directors for the first year are as follows: William Ottman, Henry E. Schwartz and Septime S. Sanguenette, of Brooklyn.

ELECTRIC LIGHTING.

GENEVA, IND.—H. O. Fisher, of Toledo, Ohio, is trying to secure a franchise to install an electric light plant at Geneva.

LAREDO, TEX.—The Cannel Coal Company has closed a contract to have a complete electric plant installed at its mines, twenty miles above Laredo, at a cost of $30,000. All work in the mines will be done by power furnished by electric motors.

HYATTSVILLE, MD.—Bids have been invited for installing an electric lighting system in Hyattsville, the voters having recently approved a bond issue of $12,000 for this purpose. Hyattsville has been practically without street-lighting facilities for about six months, and the citizens are anxious to remedy the conditions.

EAST LIVERPOOL, OHIO—Steps are being taken to secure information concerning municipal operation of lighting plants by the East Liverpool council. The contract for city lighting with the East Liverpool Traction and Light Company expires soon, and it is expected that the company will seek a renewal of the contract for at least three years. The council appropriates annually about $12,000 for street lighting.

RICHMOND, VA.—The common council at its last regular meeting failed to pass the ordinance providing for an electric light plant to be owned and operated by the city. The vote was lost through lack of a two-thirds majority, standing eighteen to twelve. The finance committee and the board of aldermen had already reported adversely on the proposition. The matter will probably come before the new council, which will convene early in September.

HEMPSTEAD, L. I.—The trustees of Hempstead have received from Robert M. Van Dorn an application for a franchise to erect and maintain a system of electric lighting, heating and power. The applicant agrees to furnish lighting to the village at a considerable reduction from the present rate paid, also to improve on the system of installation now in vogue. The trustees have requested the applicant to furnish evidences of his financial backing before they act on his application.

SCHAGHTICOKE, N. Y.—It is thought that shortly a dam will be built on the Hoosic river, near Schaghticoke, for impounding water for a power plant. Borings are being made under the direction of Charles Hollingsworth to determine the character of the rock of which there is in the vicinity sufficient to entirely construct the dam. It is expected that the power plant will form another of the series that have been built by the Hudson River Water Power Company, although it has not been authoritatively stated that this company is responsible for the survey now going on.

YAKIMA, WASH.—William Filey has sold his 160-acre farm on the Columbia river at lower Priest Rapids to the Hanford Power and Irrigation Company, of Seattle. The price is not made public, but it is understood to be in the neighborhood of $20,000. The company is composed of a number of leading capitalists who propose to put in a large pumping plant for the purpose of pumping water from the Columbia river for irrigating the arid lands on the west side of the stream. They also expect to erect a large electric plant and will furnish power to the land owners in that section, who in turn will put in plants for pumping the water and irrigating their farms.

WILMINGTON, DEL.—Mayor Horace Wilson has vetoed the franchise recently granted by the street and sewer department to the Commercial Light, Heat and Power Company. The company promised to pay the city $50,000 within eighteen months for the franchise, one-fourth to be paid within ninety days, to give the city three per cent of the gross receipts for electricity furnished to others than the city; to furnish the city arc lights at $40 per year each, electricity for street lighting at two cents per kilowatt and for public buildings at five cents per kilowatt, and to the public at a rate not exceeding ten cents per kilowatt, to furnish gas to the city at seventy-five cents per thousand cubic feet for street lighting and ninety cents per thousand cubic feet to the public. The mayor said he did not think additional franchises of the kind were necessary or advisable, that in future only such as provided for underground conduits should be granted, and he was not convinced that the city would be benefited by the corporation in question. A movement is said to be on foot to secure a franchise for a gas and electric company composed of local interests.

ELECTRIC RAILWAYS.

MARYSVILLE, CAL.—The city council of Marysville has granted the Northern Electric Company a franchise to build through the streets of that city.

ASHLAND, KY.—The Ashland Interurban Street Railway Company has secured a franchise for its line through Greenup county. The company's engineers are at work, and the line will be constructed as rapidly as possible.

EAST LIVERPOOL, OHIO—After two years of fighting, J. L. Francis has secured the passage of a franchise ordinance which gives the Ohio River & Northern Railroad Company the right to build a second railroad through East Liverpool.

CHAMBERSBURG, PA.—An application will be made on August 28 for a charter for the Chambersburg & Western Electric Railway Company, the line to run from Shippensburg to Chambersburg, thence to Fort London, a distance of twenty-five miles.

SEATTLE, WASH.—The city council has passed an ordinance calling for a special election to vote on the issuance of $4,273,000 worth of bonds for a municipal street-railway system and the extension and enlargement of the Cedar river water system. The date of the election was set for September 12.

MASONTOWN, PA.—W. J. Sheldon, F. S. Gleason, Sr., O. K. Eaton, T. J. Lewis and T. B. Black, of McKeesport, with C. M. Watt, of Pittsburg, and G. R. Anderson, Lewis Kail, Dr. J. H. Cloud, Frank A. Madas and James Sterling, of Masontown, have secured a charter for a new street-car line into Masontown. The title of the concern is the Masontown Electric Railways Company.

UTICA, N. Y.—The Utica & Mohawk Valley Railway Company has filed an application for a franchise to construct, maintain and operate a double track on North Genesee street to Deerfield Corners, a single track from the Corners westerly along the Marcy road to the Seymour road, and a single track from the Corners northerly to the reservoir. Permission is also asked to erect the necessary poles, switches, etc., to maintain and operate the Deerfield road by electricity instead of by horse power.

FORT WORTH, TEX.—It is announced that the merger of the Arlington Heights Traction Company, Rosen Heights Street Railway Company and Citizens' Light and Power Company, all of Fort Worth, has been accomplished. W. W. Christy, H. H. Johnson and S. M. Kelsey, of Cleveland, and C. B. Close, of Toledo, represent Cleveland capital, and the company will be the largest in the state. Millions of dollars are to be expended in building and equipment, including a fifty-mile interurban line from Fort Worth to Mineral Wells, the noted Texas health resort.

WASHINGTON, PA.—The borough council has granted a perpetual franchise over certain streets in Washington, Pa., in favor of the Washington & Canonsburg Street Railway Company. The Pittsburg Railways Company will reach Washington by the new road, and will operate a car line direct from Pittsburg to Washington. It is hoped to have cars running before winter. Large interurban cars will be used, and Pittsburg will be reached through the Mount Washington tunnel. The company is already at work on the upper end of the line and is building from a point on the Charleroi line to Canonsburg.

LORAIN, OHIO—The Lake Shore Electric Railway Company is planning to spend hundreds of thousands of dollars on improvements to its lines in the near future. According to a despatch from Lorain, the company intends to set aside $750,000 for these improvements, which will be on a large scale. The Lorain despatch says: "With the filing of incorporations at Columbus for the Lorain Street Railroad Company, with a capitalization of $2,500,000, the Avon Beach & Southern and the Lorain Street Railway companies will sink into oblivion. With the incorporation of the new company the property of the two companies will be merged into one and will be known under the new name. In addition to merging the two roads, the value of which is placed at $1,750,000, a bond issue of $750,000 is also to be provided for, which will be used in the improvement of the line now operated on Broadway in Lorain. The bonds are issued in the name of the Lorain Street Railroad Company, but are guaranteed by the stockholders of the Lake Shore Electric. The company will double-track the Lorain Street Railway from Lorain to Elyria, and will remove the loop in the business district of Lorain."

INDUSTRIAL ITEMS.

THE ALLIS-CHALMERS COMPANY, Milwaukee, Wis., in bulletin No. 1416 describes and illustrates the style K Gates rock and ore-breaker.

THE AUTOMATIC ELECTRIC COMPANY, Chicago, Ill., is sending out a neat postal card showing an illustration of its enlarged factory at Van Buren and Morgan streets.

THE OSWEGO BOILER AND ENGINE COMPANY, Oswego, N. Y., will be pleased to send bulletin No. 50-A, giving statistics concerning its horizontal return tubular boilers.

THE NEWTON MACHINE TOOL WORKS, Twenty-fourth and Vine streets, Philadelphia, Pa., will send catalogue No. 44, describing keyseat milling machines, to any one interested upon request.

THE CROCKER-WHEELER COMPANY, Ampere, N. J., in bulletin No. 66, describes and illustrates form W motors for rolling mills. These are for 220 volts, one speed, either series or compound-wound.

PASS & SEYMOUR, INCORPORATED, Solvay, N. Y., are mailing to the trade a very attractive circular-letter. The wording of this letter is particularly clever, and the company ought to secure great results from its distribution.

THE SARGENT STEAM METER COMPANY, Chicago, Ill., has ready for distribution an attractive little booklet describing and illustrating the Sargent steam meter. This booklet will be mailed to any one interested upon request.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, New York, N. Y., has ready for distribution a new booklet showing net prices and discounts covering contents of catalogue No. 21, and also showing changes and corrections which have occurred since publication.

THE ELECTRIC GOODS MANUFACTURING COMPANY, Boston, Mass., in bulletin No. 9 describes and illustrates a few examples of representative installations. This bulletin has been very carefully prepared, and will be found of great usefulness to any one interested in this apparatus.

THE CENTRAL ELECTRIC COMPANY, Chicago, Ill., is sending out to the trade its cost price list applying to its general catalogue No. 24. The prices quoted are the latest in force, and it is suggested that any one who has been overlooked in the distribution to write to the company for a copy.

THE FORT WAYNE ELECTRIC WORKS, Fort Wayne, Ind., has issued bulletin No. 1081, describing and illustrating type A transformers. Bulletin 1080 describes multiphase, revolving field, engine-type generators. A price sheet for catalogue No. 2004, to replace page 73, gives new prices for parts of "Wood" form 1 arc regulator.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Ct., has produced a very neat bulletin entitled "How Shall We Know Good Switches?" This literature is really more than an advertising proposition, as it contains some engineering data which can be assimilated to advantage by every one interested in this material.

THE MARSHALL ELECTRIC MANUFACTURING COMPANY, Boston, Mass., is beginning the erection of a new factory at Waltham, Mass. This has become necessary in order to take care of the company's increasing business. The Marshall company reports a brisk demand for its new "Peerless" switch, which is carried in stock in large quantities at Boston, New York and Chicago.

THE STANLEY-G. I. ELECTRIC MANUFACTURING COMPANY, Pittsfield, Mass., has issued bulletin No. 609, superseding bulletins No. 25 and No. 194, devoted to floor and wall outlet boxes. Circular 786 is devoted to new type K arc lamps. Circular 787 is devoted to direct-current motors and generators. Any of this literature may be secured by addressing the Pittsfield office or any of the branch offices.

CHARLES F. JOHNSON, Cleveland, Ohio, announces a number of bargains in railway motors, interurban cars and general railway and electrical equipment. Mr. Johnson makes a specialty of mail-order business for heavy supplies. The company has recently established new offices at 710 Citizens' Building. Offices are also located at 623 Ellicott square, Buffalo; 111 Broadway, New York city, and 1240 First National Bank Building, Chicago.

THE LOCKE INSULATOR MANUFACTURING COMPANY, Victor, N. Y., announces that it will shortly issue its new catalogue No. 9, which will be prepared on lines similar to the company's catalogue No. 8, "The Insulator Book." In addition to the regular English edition there will be published a polyglot edition printed in Spanish, German and French. This has been found necessary on account of the company's extensive foreign trade.

THE MURRAY IRON WORKS COMPANY, Burlington, Iowa, has published a handsome catalogue descriptive of Murray Corliss engines, high-pressure boilers and complete power plants. This catalogue is replete with interesting information concerning this character of equipment, and in addition to the text there are many half-tone illustrations of equipment and typical applications, and line-drawings and diagrams showing the parts of the apparatus in detail.

THE TRUMP MANUFACTURING COMPANY, Springfield, Ohio, is distributing some attractive literature describing the features of Trump turbines. These turbines are guaranteed under heads as low as three feet and as high as 300 feet. The company builds horizontal turbines on draught chests, either single or in pairs. The company is also constructing vertical turbines in steel and cast-iron casings. Full information and literature will be sent upon request.

THE WESTERN TUBE COMPANY, Kewanee, Ill., has ready for distribution a booklet regarding a new discovery in bronze mixture known as the "High-Duty" metal. As indicated in the pamphlet, this metal shows a loss in efficiency when subjected to high temperatures of only 5.6 per cent. The company announces this metal as a distinct advance in bronze compositions, and asserts that the discovery is worthy of careful consideration. Copies of the pamphlet will be forwarded upon request.

THE WESTINGHOUSE MACHINE COMPANY, East Pittsburg, Pa., has recently contracted with the Sheffield Company for a 1,250-kilowatt Westinghouse-Parsons steam turbine to be installed in its plant at Sheffield, Ala. The turbine will run under rather poorer operating conditions than usual—a steam pressure of 125 pounds and twenty-six-inch vacuum. It will be direct-connected to a Westinghouse three-phase turbo-generator of the enclosed type, delivering current at 2,300 volts to a light and power system.

"PHONO-ELECTRIC TROLLEY AND TELEPHONE WIRE" is the subject of several unique pieces of literature recently issued by the Bridgeport Brass Company, New York city. One of these folders sententiously reports: "Over seven years ago we received a letter of enquiry from one of the largest street-railway companies asking about 'Phono-Electric' wire. We gave them all the data at our command; showed them where the relative proportion of efficiency was considerably in favor of 'Phono-Electric' over hard-drawn copper wire. Now, they did not exactly doubt our word, but they made their own tests, and in a short time we received their first order. To-day they operate over 500 miles of track, and every foot of overhead wire is 'Phono-Electric.'"

THE STRAUSS BASCULE AND CONCRETE BRIDGE COMPANY and the WALLACE-COATES ENGINEERING COMPANY, Chicago, Ill., announce that they have entered into an agreement whereby the latter will act as general sales agent and constructor for the Strauss bascule and concrete bridges. The rapid growth of the Strauss Bascule and Concrete Bridge Company has necessitated the division of the business, and under the new arrangement the Strauss company will confine itself exclusively to the engineering work in connection with its general designs, and will also give its attention to general engineering. The Strauss company has under way a number of prominent installations of its bascule bridges. The Wallace-Coates Engineering Company was organized a short time ago and incorporated in Maine with a capital of $500,000 by H. U. Wallace, formerly chief engineer of the Illinois Central Railroad, and who, during the past year, has been third vice-president of J. G. White & Company; and by F. R. Coates, formerly chief engineer of the Chicago Great Western Railroad, and who, during the past two years, has been vice-president of the Thomas Phee Company. The company will open an office in Portland, Ore., in charge of O. O. Alexander, general western agent.